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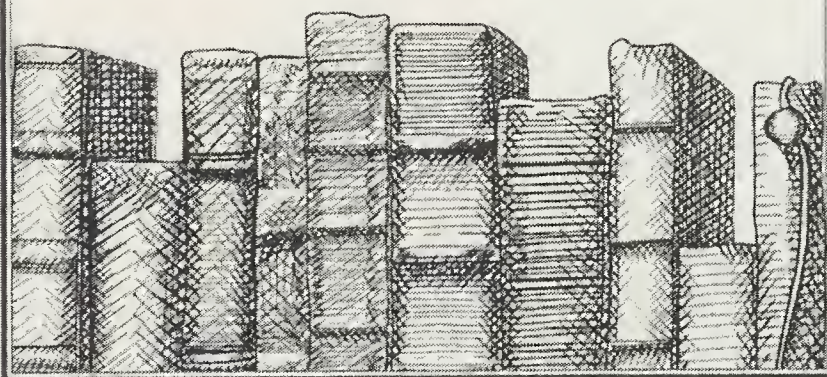
EADS BRIDGE  
AT  
ST. LOUIS



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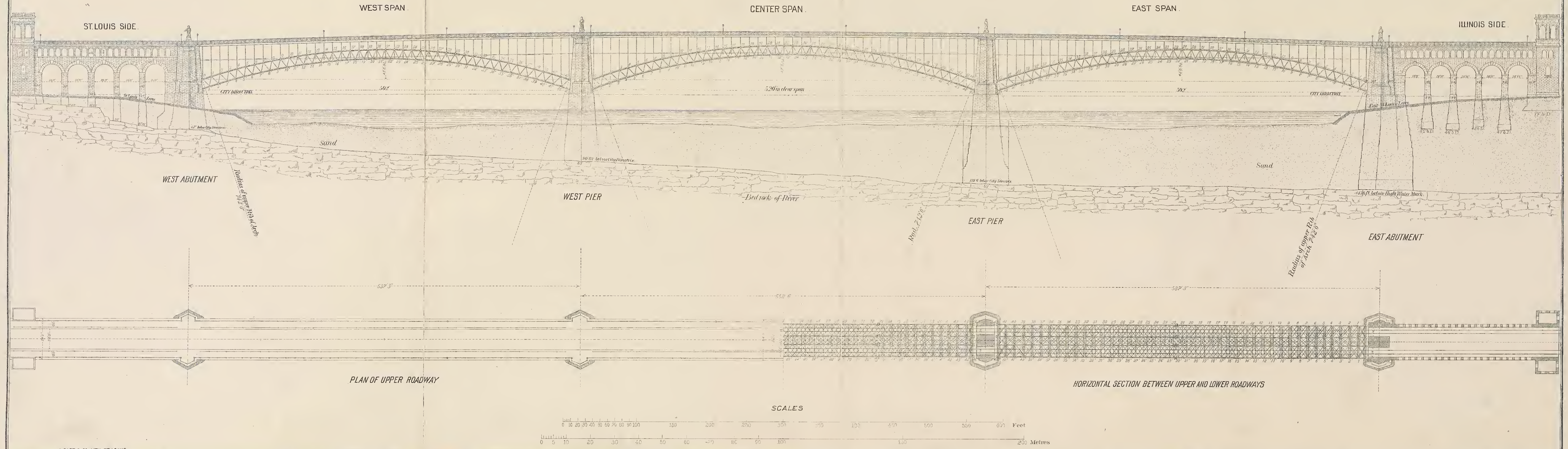




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# ILLINOIS AND ST. LOUIS BRIDGE

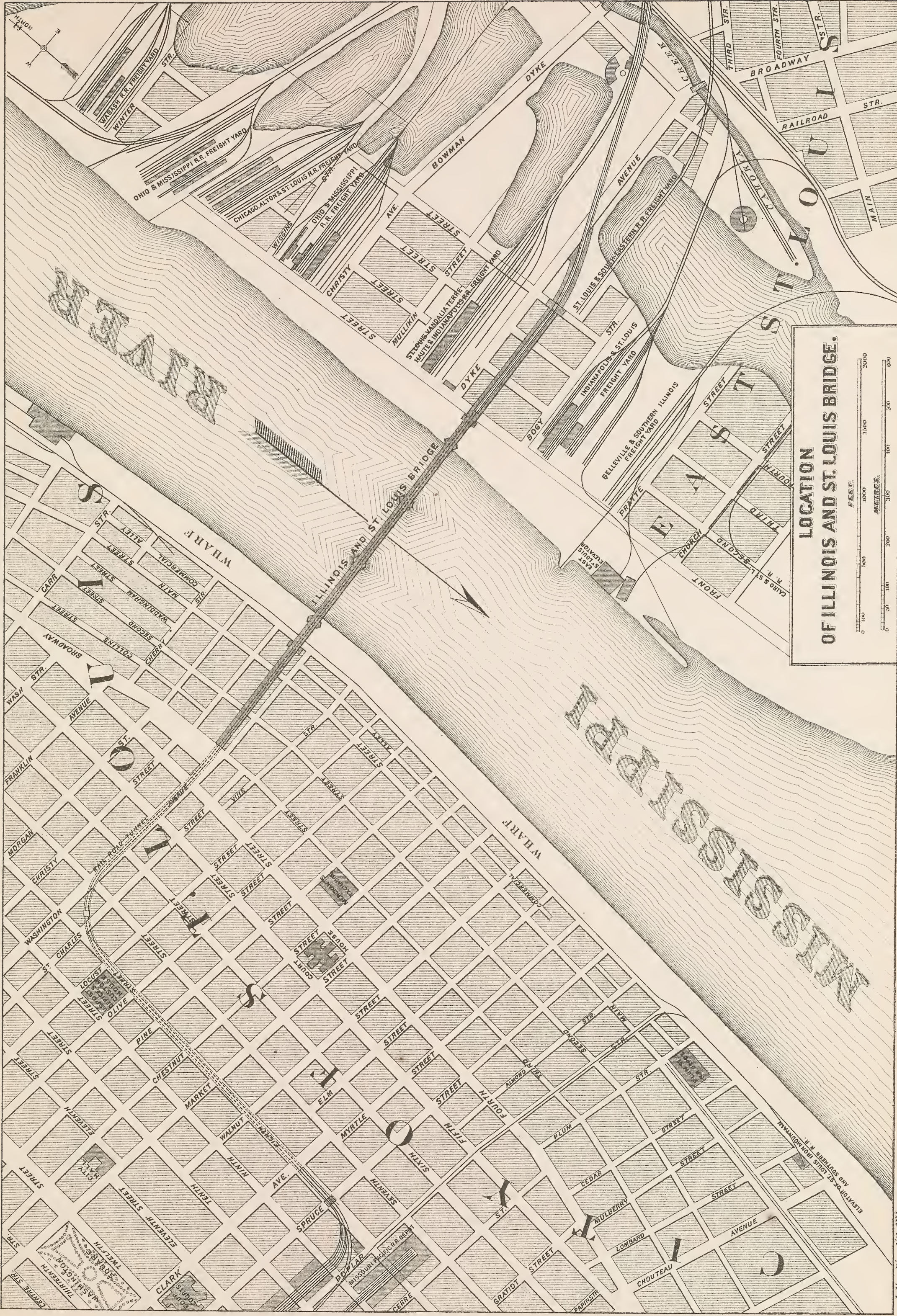
JAMES B. EADS, CHIEF ENGINEER.







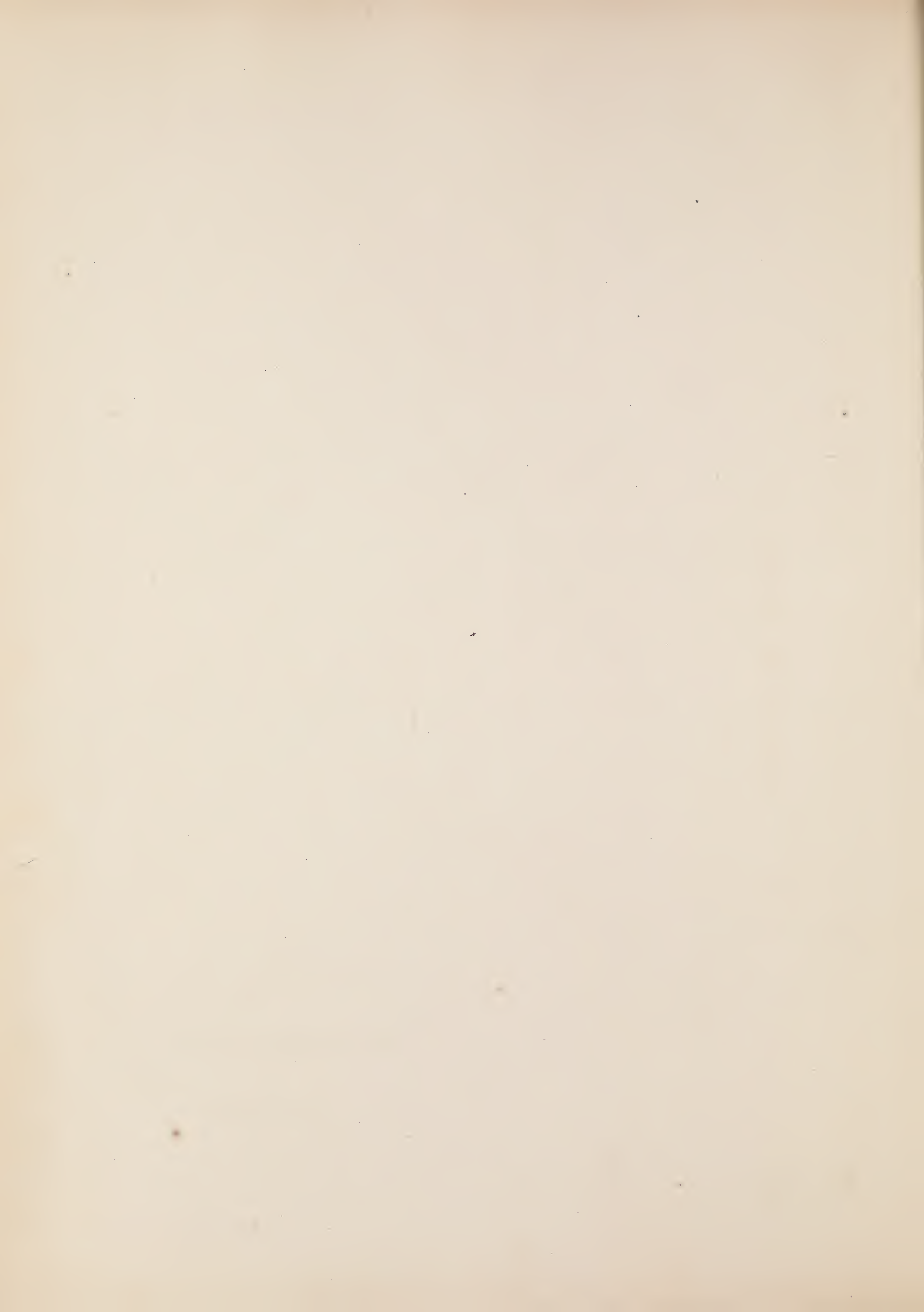




W. P. Gerhardt, del. 1880.

Julius Bien, lith. N.Y.











DIAGRAMS SHOWING THE INFLUENCE OF VARIABLE LOADS  
ON THE RIBS OF CENTRAL ARCH (520 FEET SPAN.).

SUPPOSITIONS MADE FOR THE CALCULATIONS.

WEIGHT OF SUPERSTRUCTURE - 1 TON, MOVABLE LOAD = 0.8 TONS PER RUNNING FOOT OF ARCH. AREA OF EACH OF THE TWO MEMBERS  
OF ARCH IN ENDPIECES ( $\frac{1}{2}$  OF SPAN EACH) = 100.5 SQ. INS., IN CENTERPIECE 67 SQ. INS. DISTANCE BETWEEN CENTERS OF THE TWO MEMBERS OF ARCH = 12'.

DIAGRAM 1.

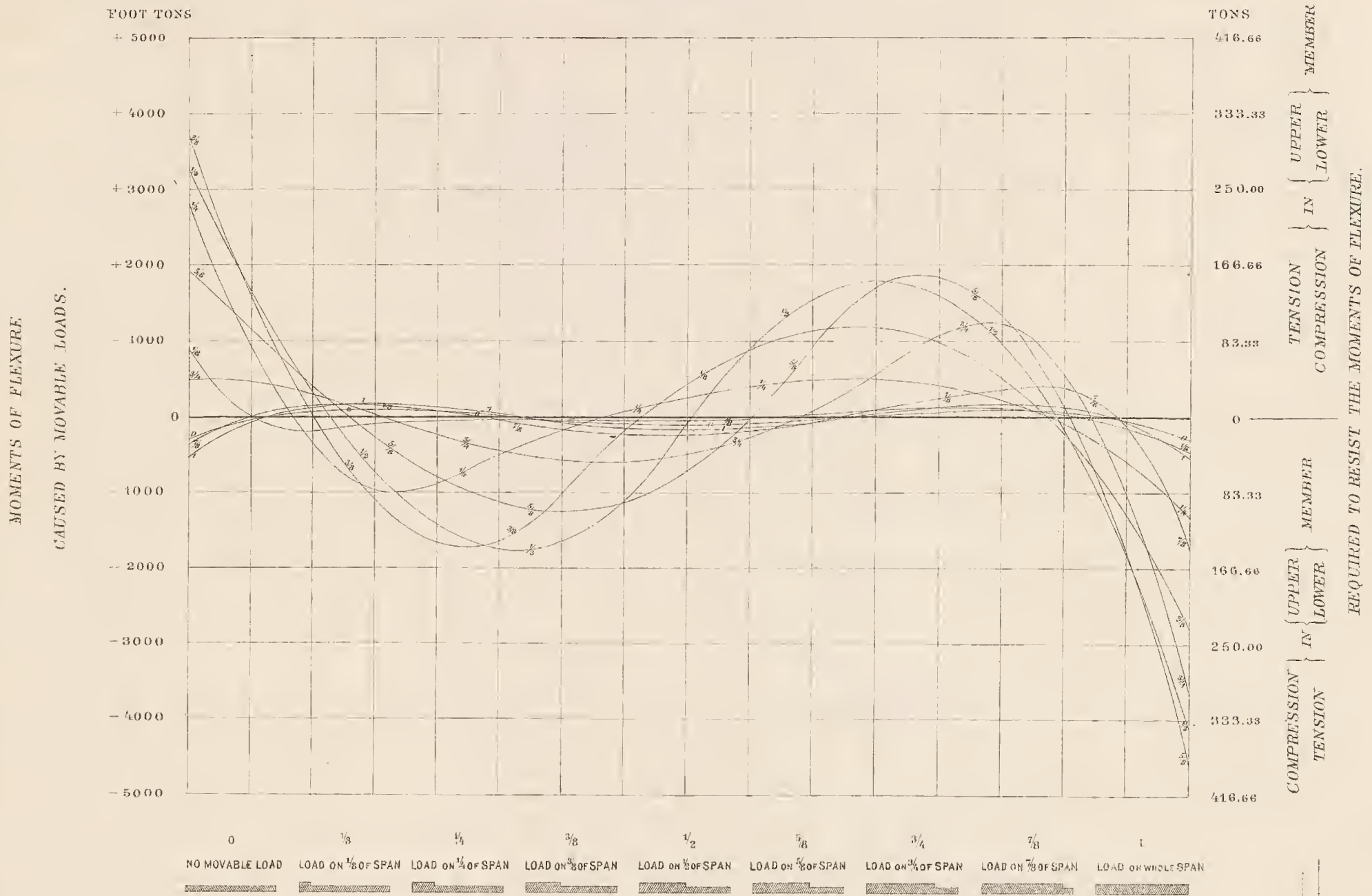
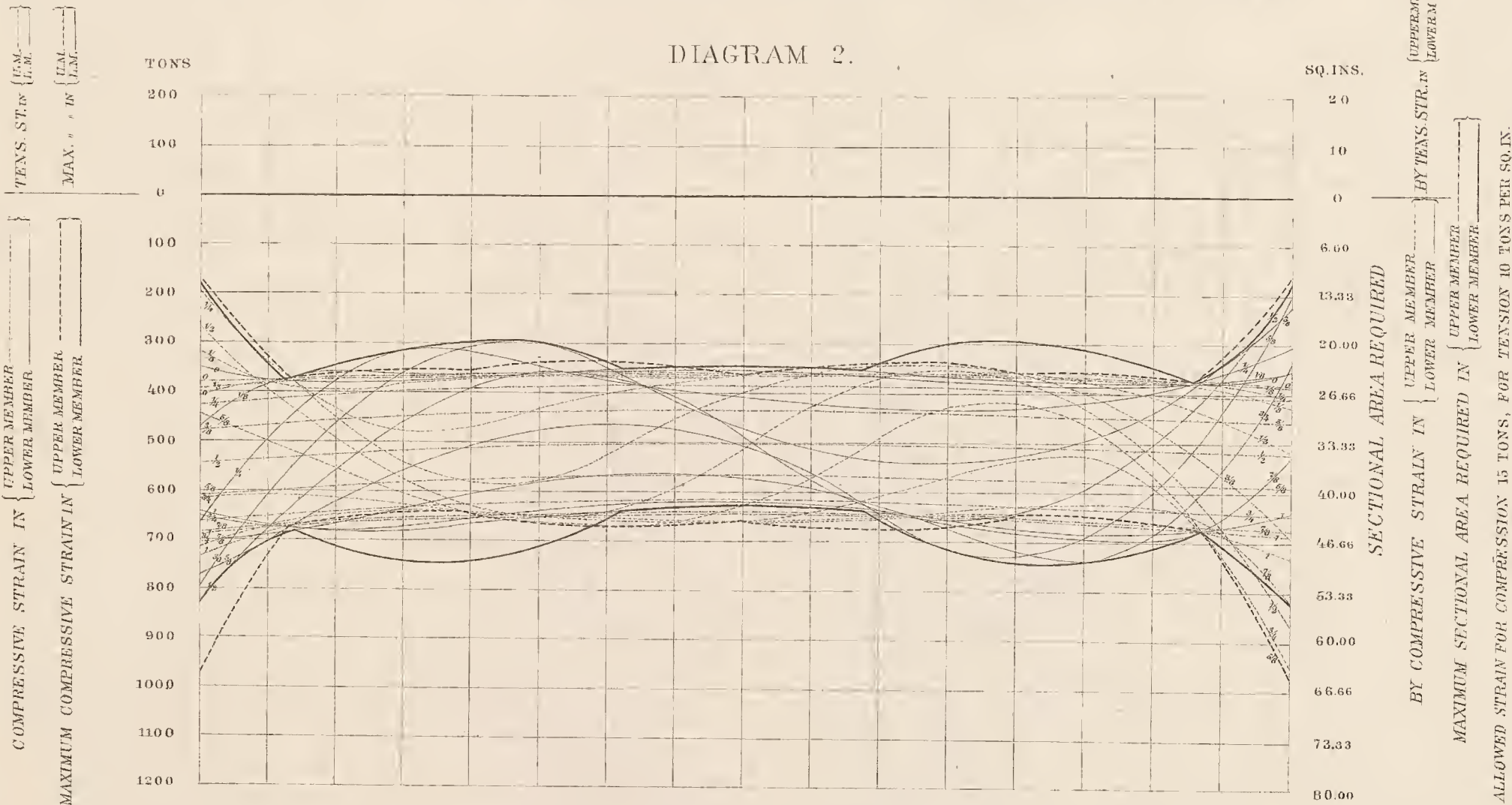


DIAGRAM 2.



THE ..... LINES SHOW THE COMPRESSION OR REQUIRED AREA IN ONE MEMBER FOR THE FORCE IN THE  
DIRECTION OF ARCH WITHOUT REGARDING THE MOMENTS OF FLEXURE.





DIAGRAMS SHOWING THE INFLUENCE OF TEMPERATURE  
ON THE UPPER AND LOWER MEMBER OF A RIB OF CENTRAL ARCH.

SUPPOSITIONS MADE FOR THE CALCULATION.  
AREA OF ONE MEMBER IN ENDPICES ( $\frac{1}{2}$  OF SPAN EACH) 100,5 SQ. INS. FOR CENTER PIECE 67 SQ. INS. - DISTANCE BETWEEN THE CENTERS OF  
UPPER AND LOWER MEMBERS OF A RIB-12 FT. MODULUS OF ELASTICITY OF CAST STEEL  $\left\{ \begin{matrix} 27,000,000 \text{ LBS} \\ \text{PER SQ. INCH} \end{matrix} \right\}$  EXTENSION BY 80°F-0,000527 OF ITS ORIGINAL LENGTH.

DIAGRAM 1.

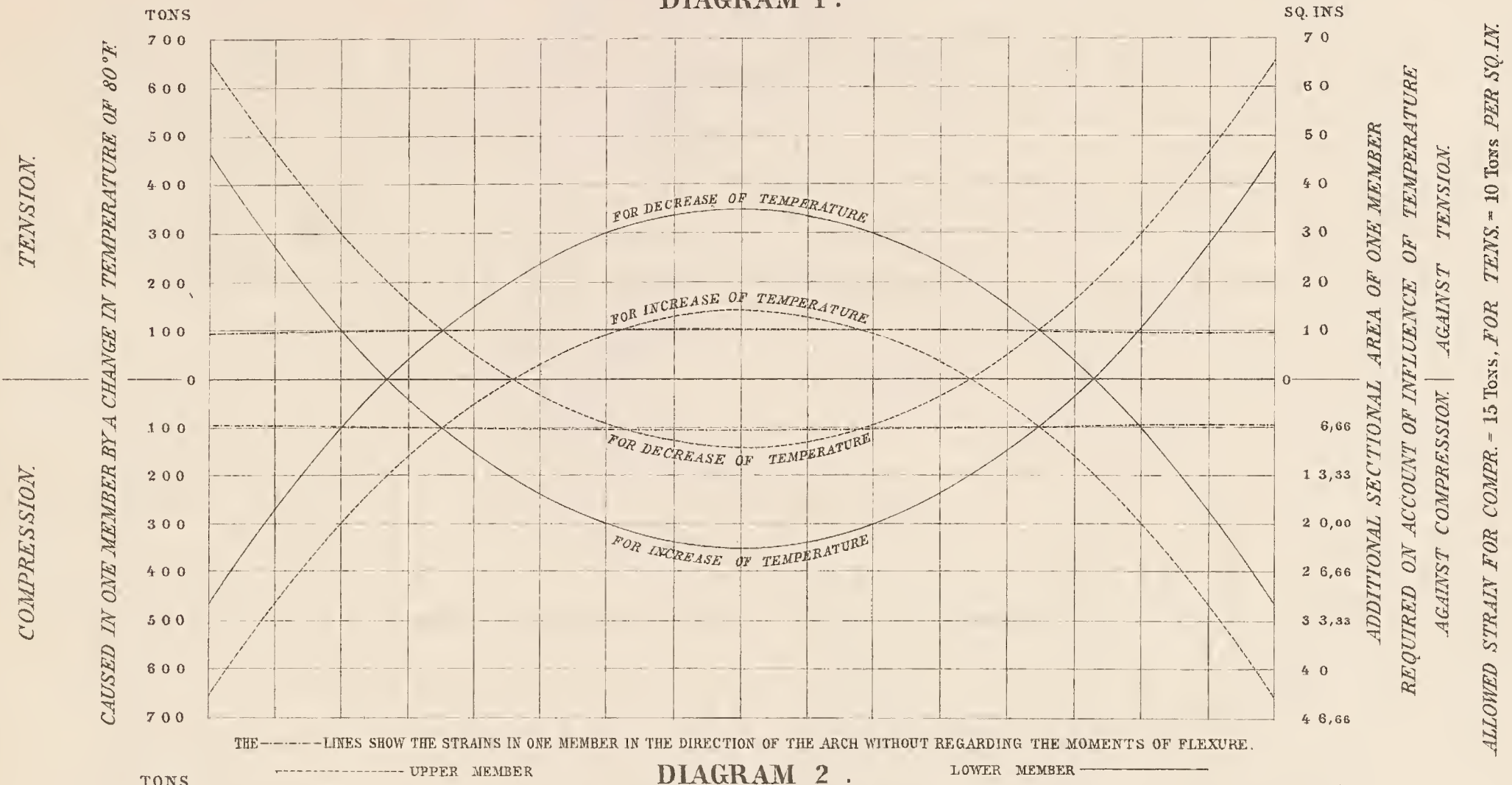
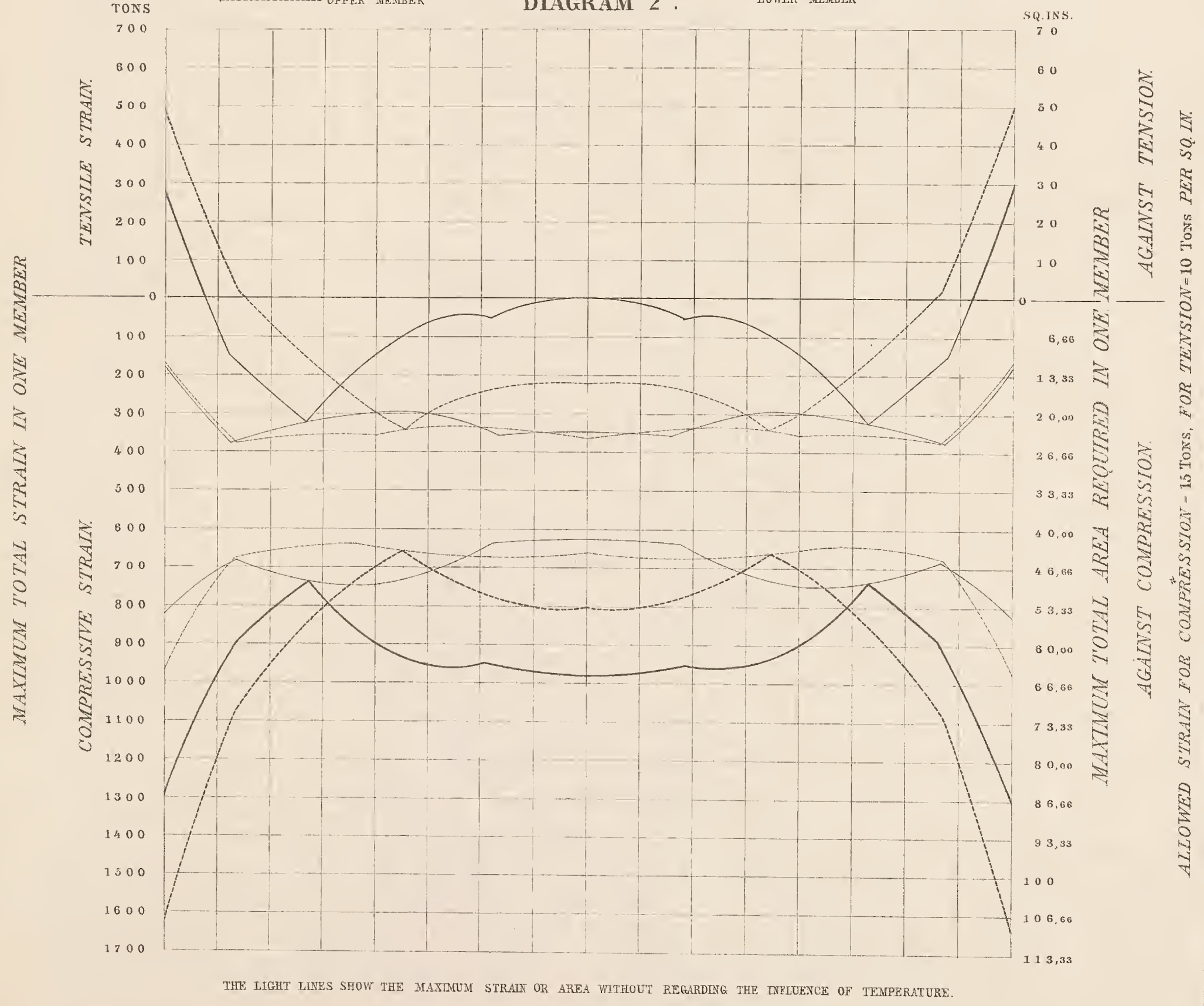


DIAGRAM 2.





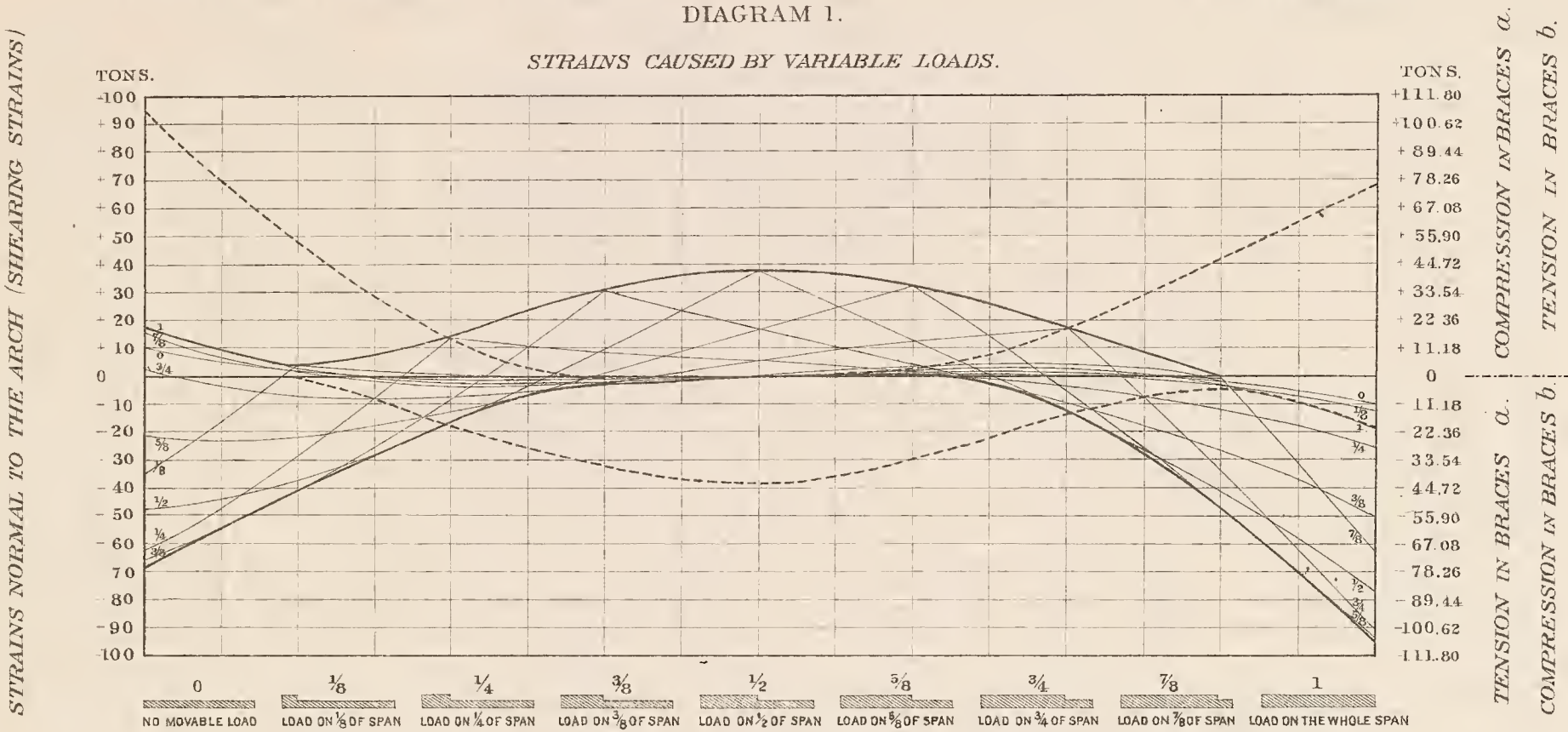


DIAGRAMS SHOWING THE STRAINS IN THE BRACES OF CENTER SPAN.

SUPPOSITIONS MADE FOR THE CALCULATIONS:

WEIGHT OF SUPERSTRUCTURE=1 TON, MOVABLE LOAD=0.8 TONS PER RUNNING FOOT OF A RIB. AREA OF EACH OF THE MEMBERS OF A RIB IN ENDPIECES ( $\frac{1}{12}$  OF SPAN EACH)=100.5 SQ. INS. IN CENTER PIECE=67 SQ. INS. DISTANCE BETWEEN THE CENTERS OF THE UPPER AND LOWER MEMBER OF A RIB=12 FEET  
MODULUS OF ELASTICITY OF CAST-STEEL=27,000,000 LBS. PER SQ. INS. EXPANSION OF CAST-STEEL FOR 80° F.=0.000527 OF ITS ORIGINAL LENGTH.

DIAGRAM 1.



THE FULL LINES SHOW THE MAXIMA OF STRAIN FOR A LOAD MOVING FROM THE LEFT TO THE RIGHT.  
THE BROKEN LINES SHOW MAXIMA OF STRAIN FOR A LOAD MOVING FROM THE RIGHT TO THE LEFT.

DIAGRAM 2.

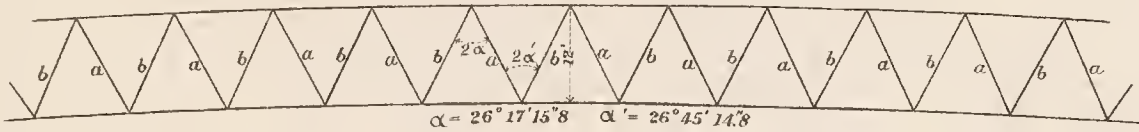


DIAGRAM 3.

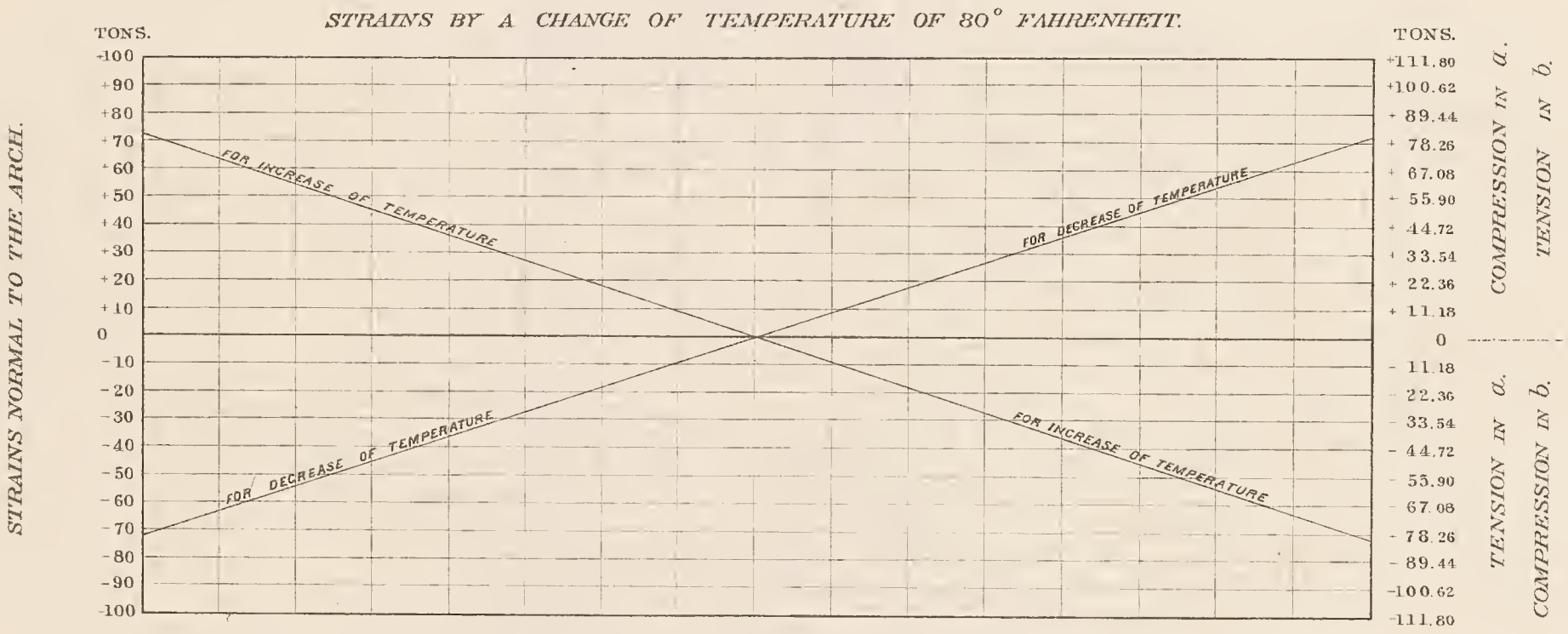
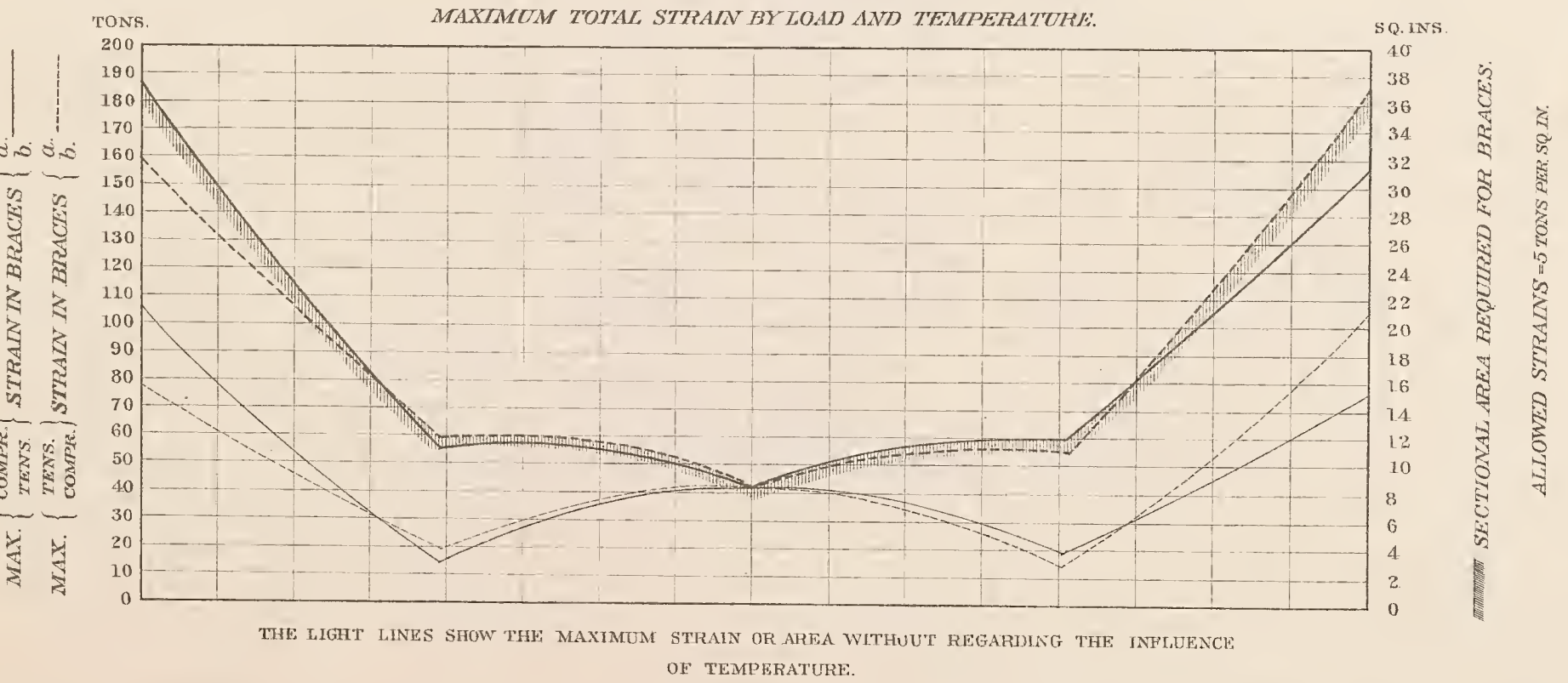


DIAGRAM 4.







## CAISSON FOR EAST PIER.

FIG. 1.

SECTION ALONG LINE CD.

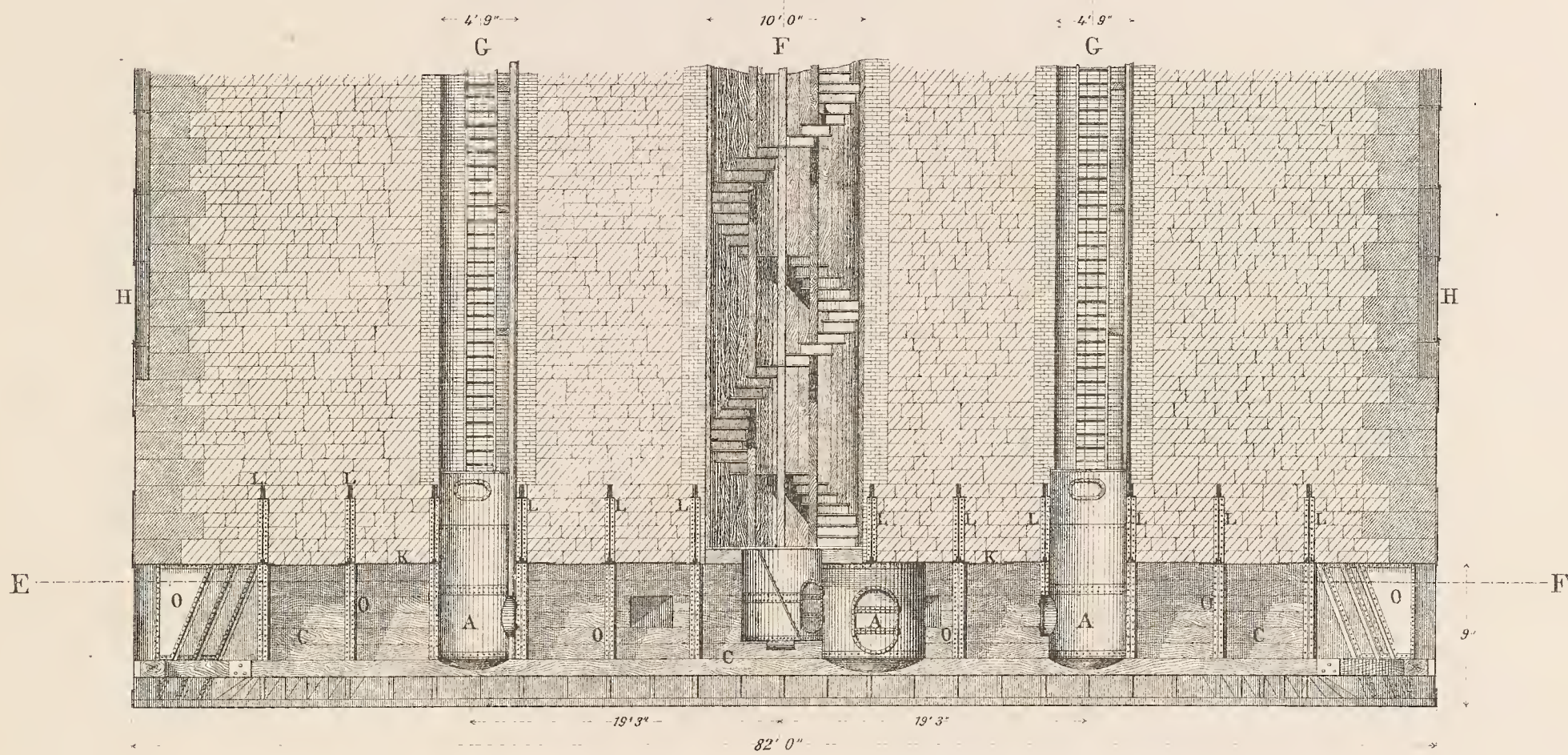
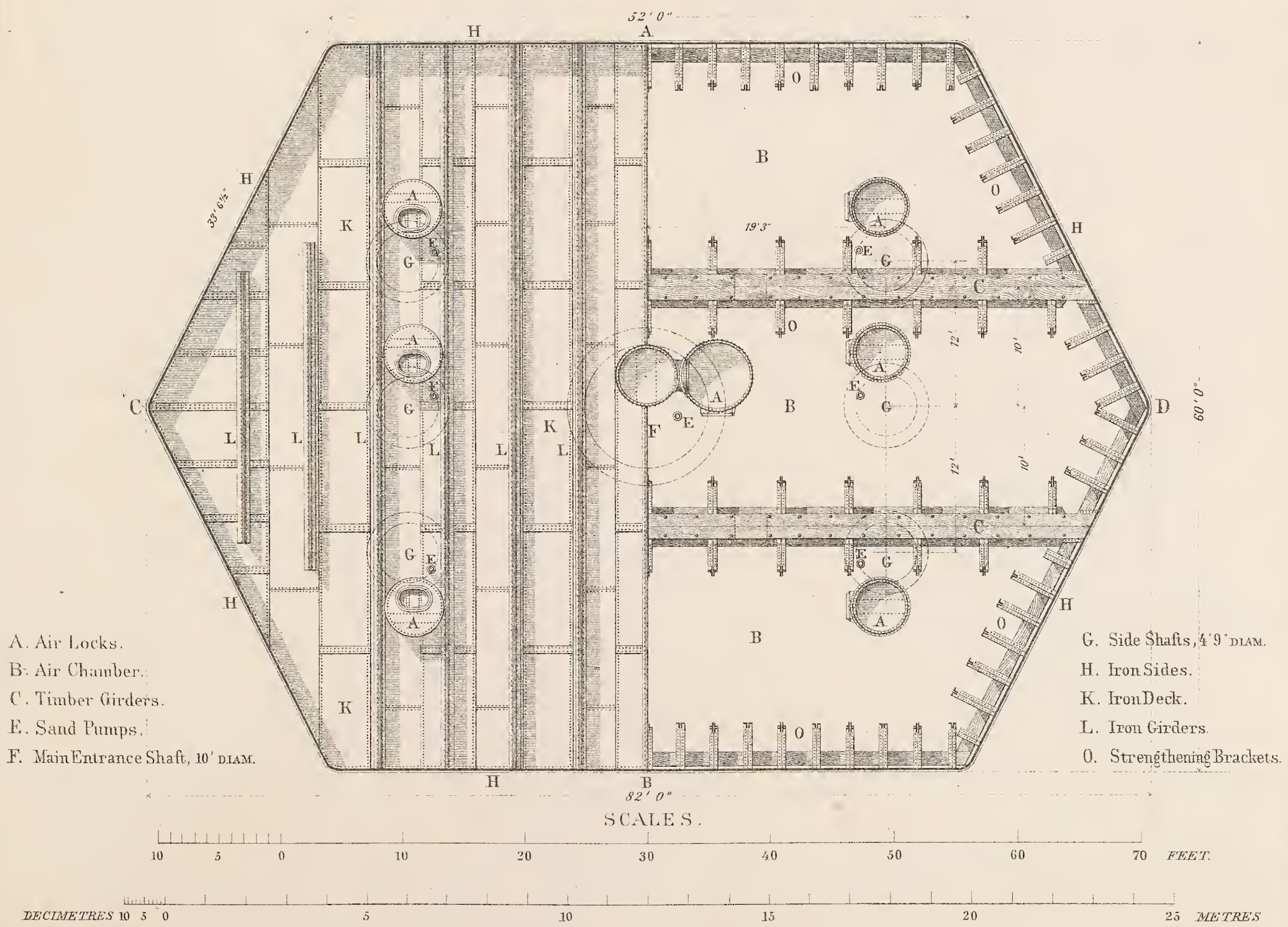


FIG. 2.  
PLAN.

FIG. 3.  
SECTION EF.



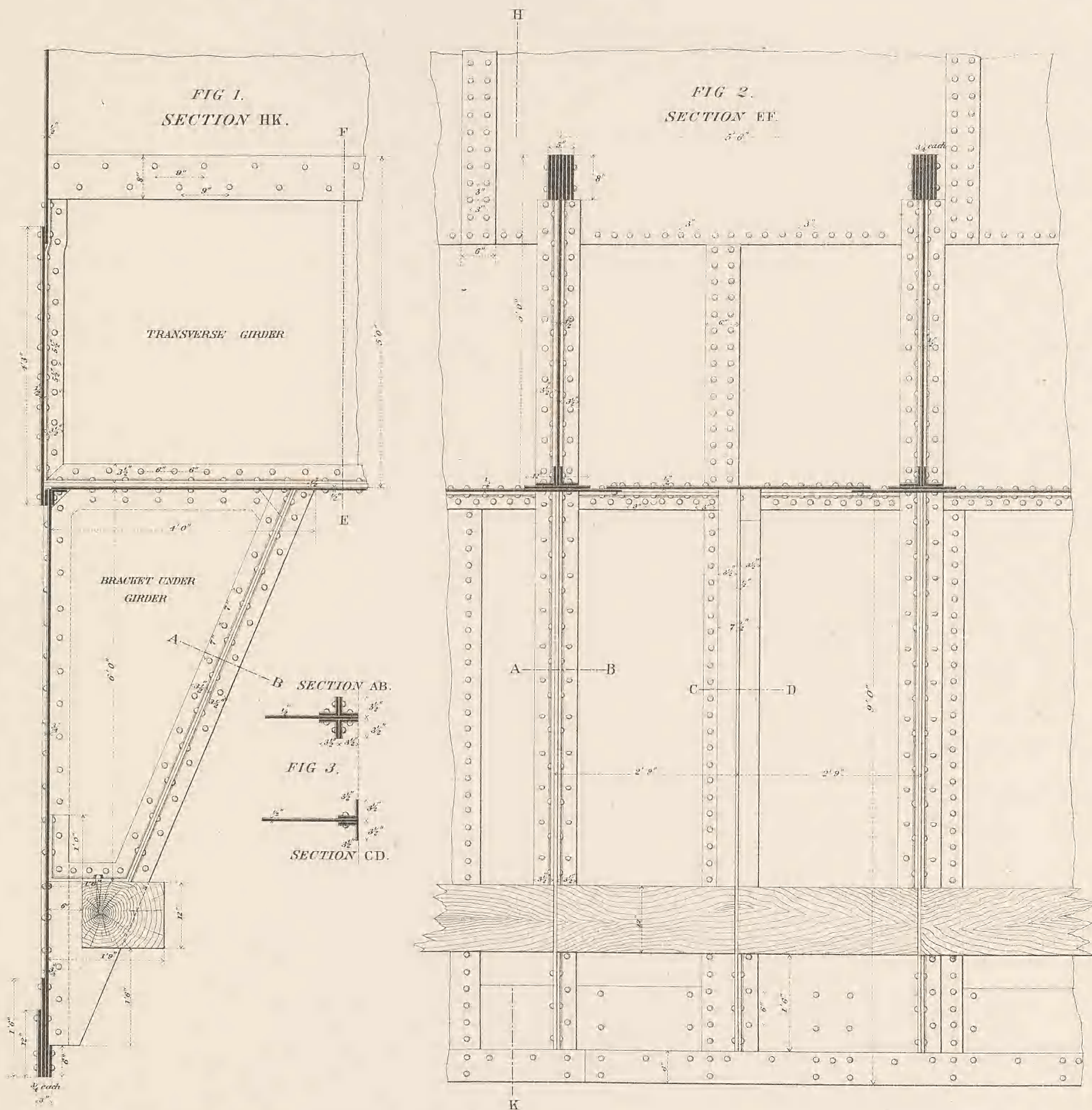




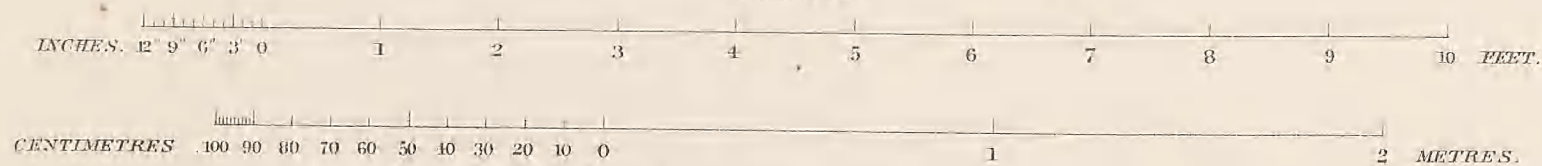


# CAISSON FOR EAST PIER.

## DETAILS OF IRON WORK.



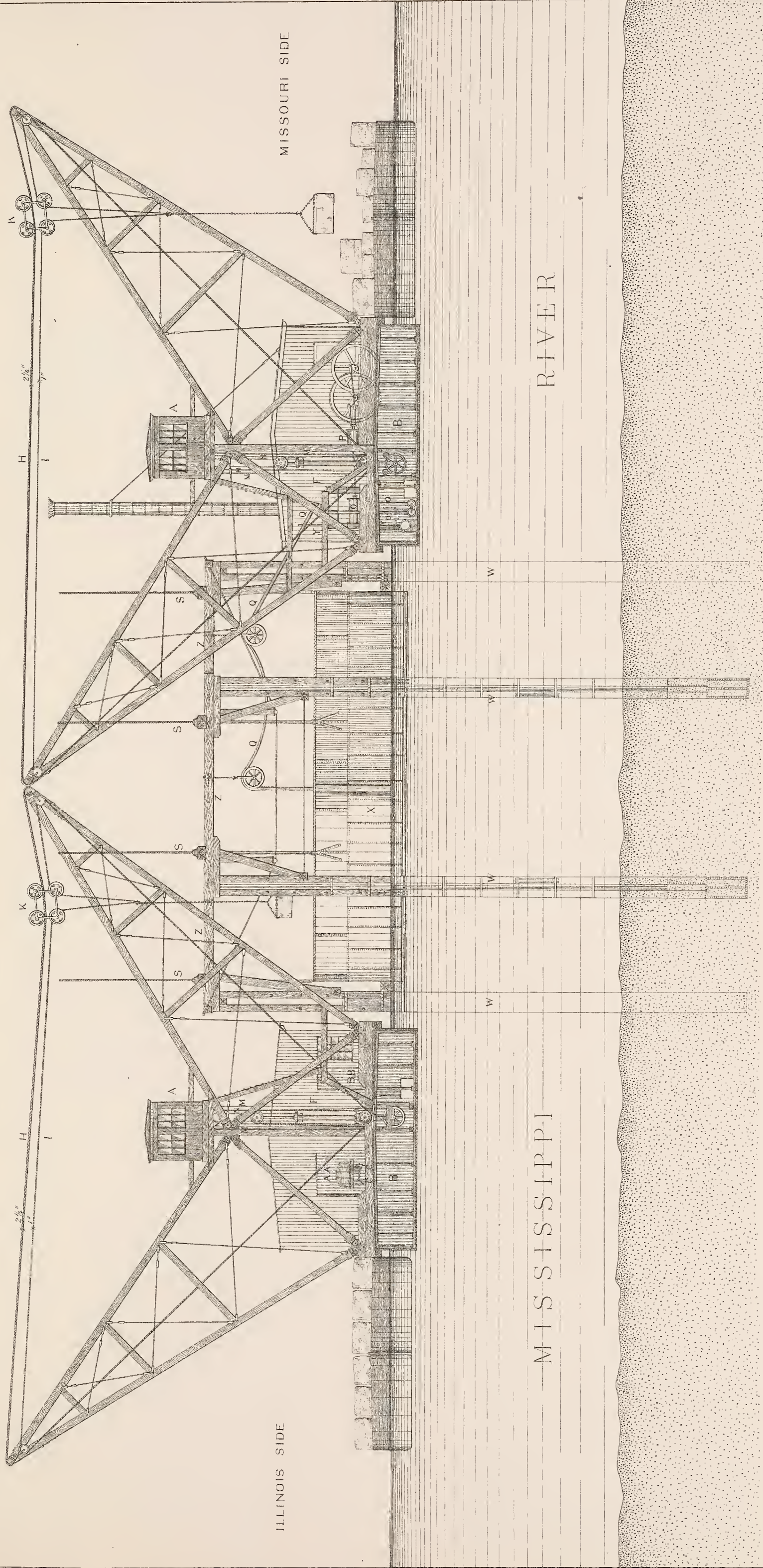
### SCALES.







VIEW LOOKING DOWN THE RIVER.

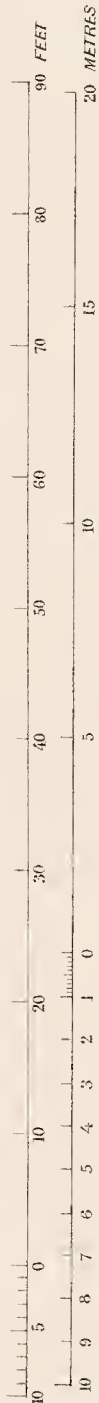


- A. CABINS FOR OPERATORS OF PURCHASES  
B. PONTOONS  
F. HYDRAULIC JACKS FOR RAISING MATERIALS  
H. WIRE CABLES TO SUPPORT TRAVELING PURCHASES  
I. WIRE HOISTING ROPES  
K. TRAVELING PURCHASES  
M. SHAFTS FOR STARTING AND STOPPING TRAVELING PURCHASES  
N. VALVES FOR HYDRAULIC JACKS FOR RAISING AND LOWERING MATERIALS  
O. AIR PUMPS  
P. ENGINES TO DRIVE AIR PUMPS

## CONSTRUCTION WORKS AND MACHINERY

FOR SINKING CAISSON AND LAYING MASONRY OF THE EAST PIER.

### SCALES



- Q. HOSE FOR SUPPLYING AIR  
S. SCREWS TO KEEP THE CAISSON LEVEL BEFORE REACHING SAND  
W. GUIDE PILES FOR CAISSON  
X. CAISSON  
Y. PIPES FOR WATER TO SAND PUMPS  
Z. TRUSSES FOR GUIDE PILES  
AA. MIXING ROOM  
BB. OFFICE  
CC. TRAMWAYS FOR CEMENT AND STONE CARS



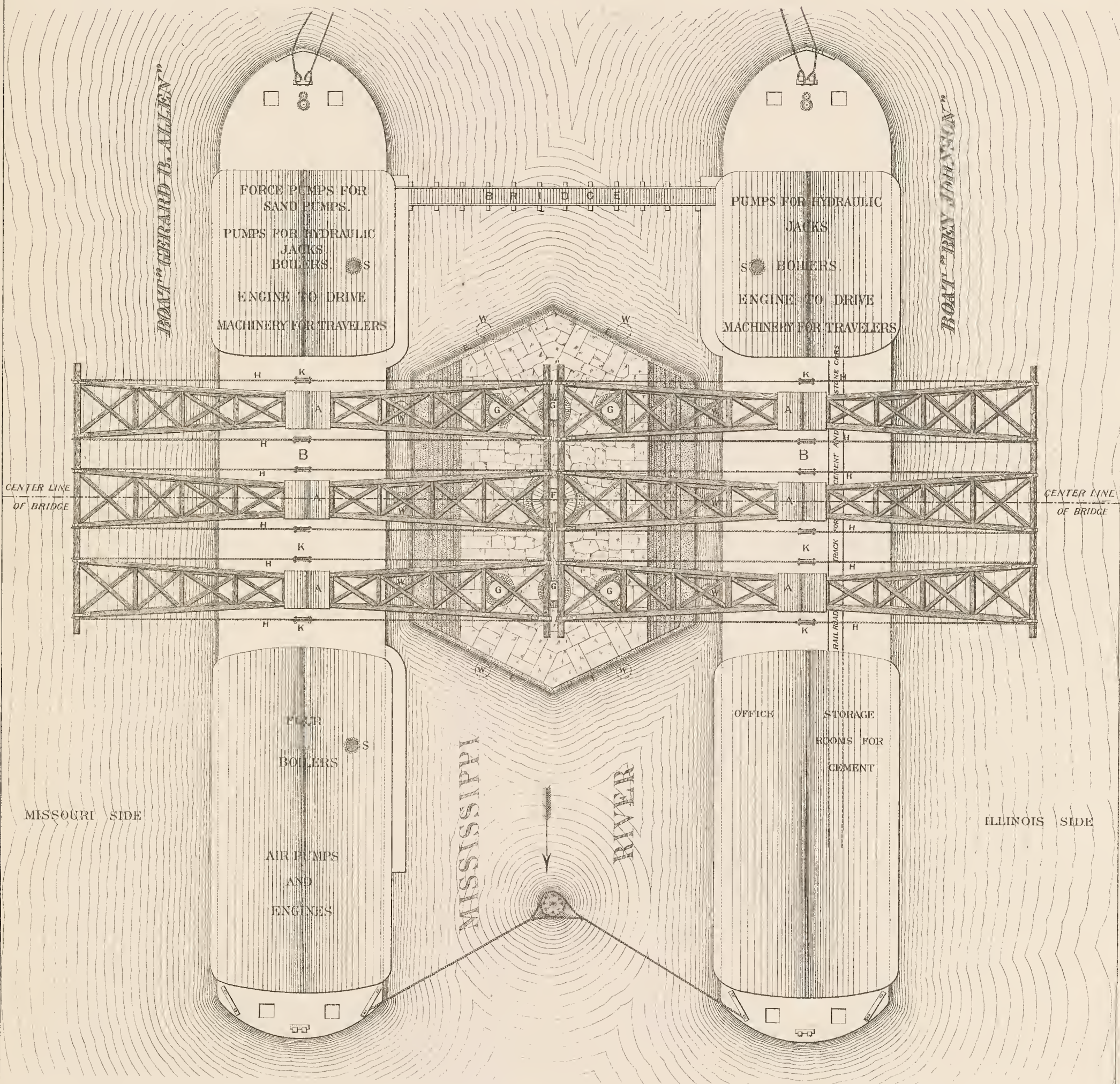




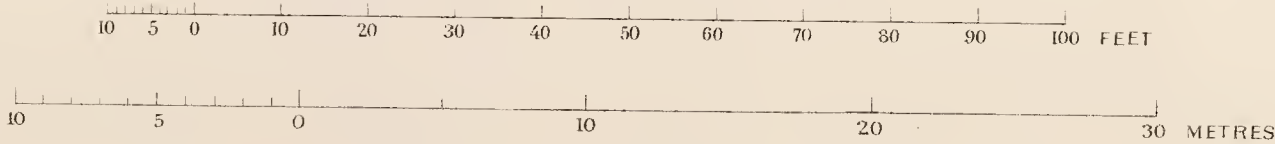
CONSTRUCTION OF EAST PIER.

PLAN OF  
PONTOONS AND DERRICKS.

A CABINS FOR OPERATORS OF PURCHASES G SIDE SHAFTS TO AIR CHAMBER  
B PONTOONS K TRAVELING PURCHASES  
F MAIN ENTRANCE SHAFT H WIRE CABLE TO SUPPORT PURCHASES  
E IRON ENVELOPE OF CAISSON W GUIDE PILES  
S SMOKE STACKS.



SCALES.









## HYDRAULIC JACKS AND MACHINERY FOR DERRICKS.

FIG. 1.

SIDE ELEVATION.

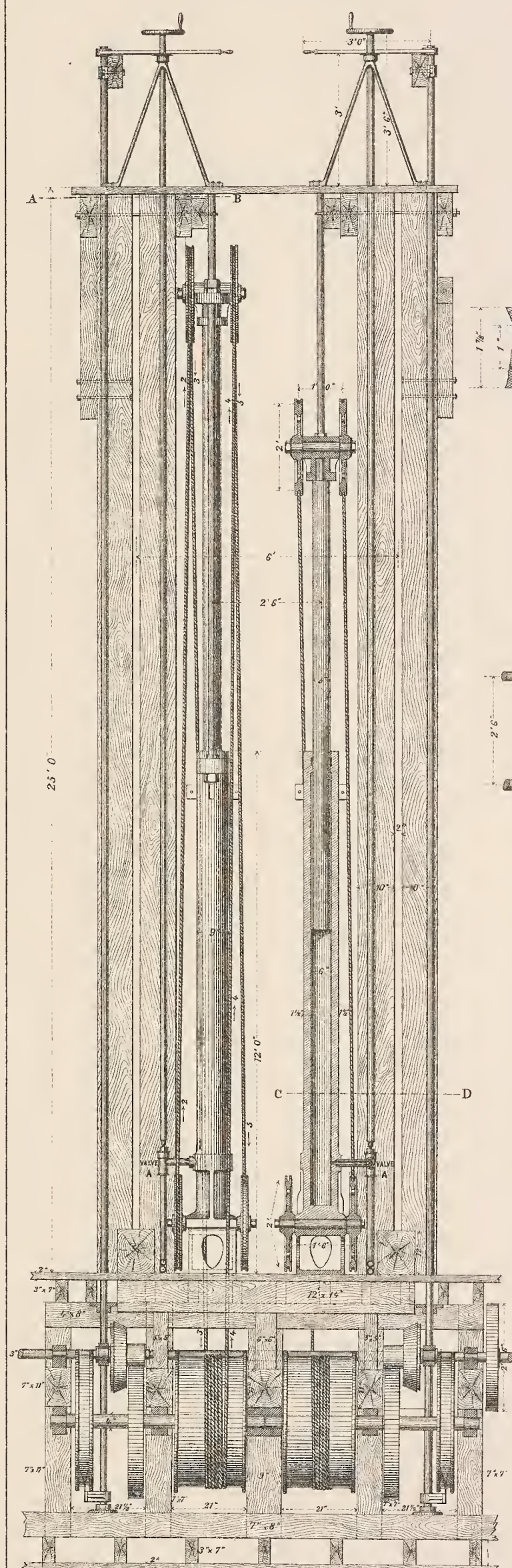
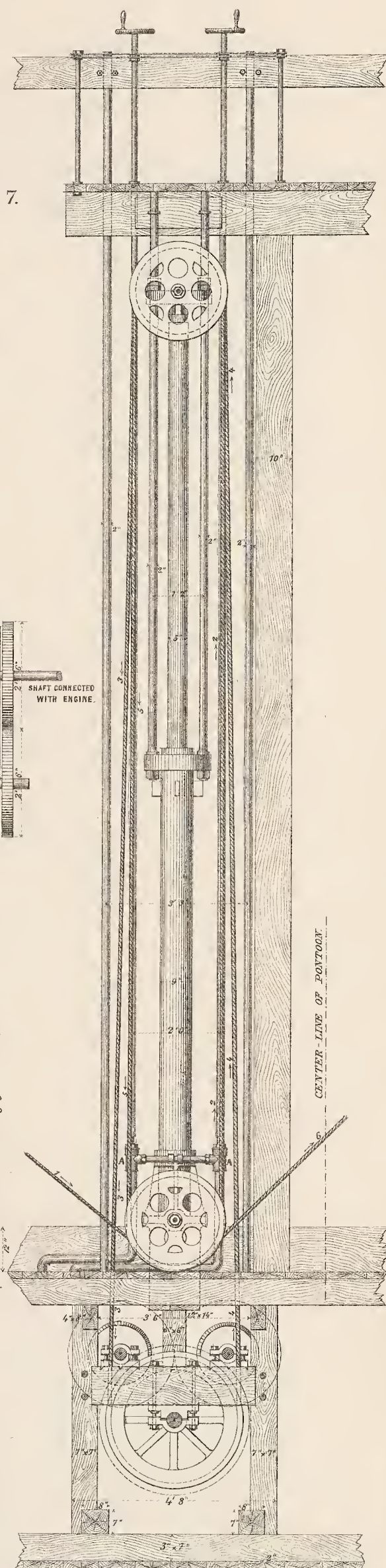


FIG. 2.

ELEVATION.



VALVE "A" FOR HYDRAULIC JACKS.

SCALES.

FIG. 6.

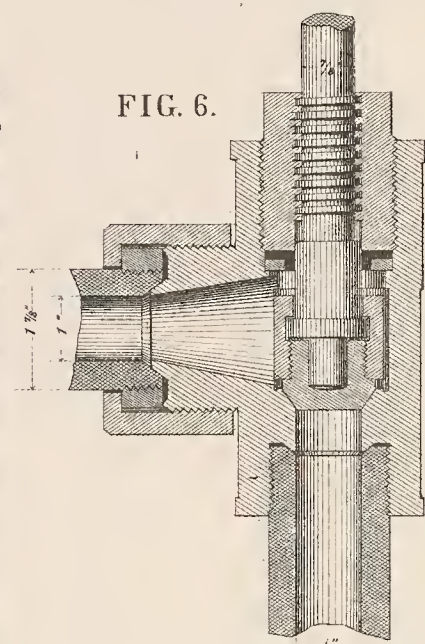


FIG. 7.

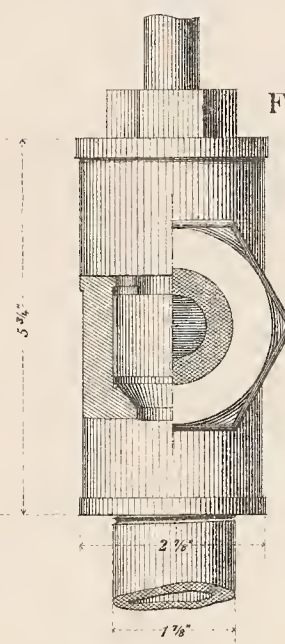


FIG. 3.  
TOP-VIEW OF GEARING.

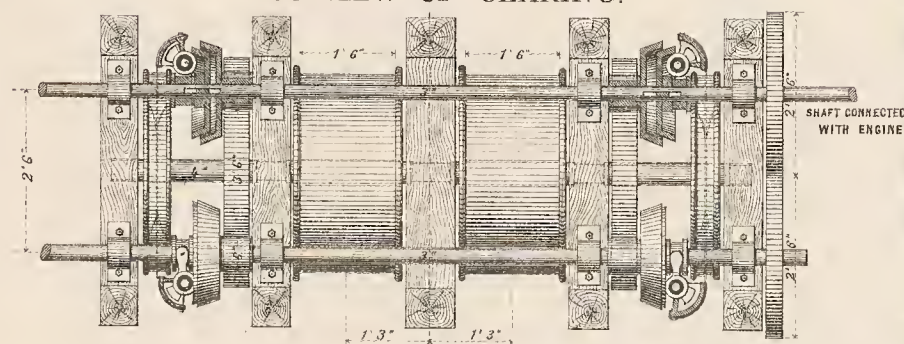


FIG. 4.

TOP-VIEW OF CABIN PLATFORM SHOWING LEVERS  
TO OPERATE GEARING AND WHEELS FOR VALVES.

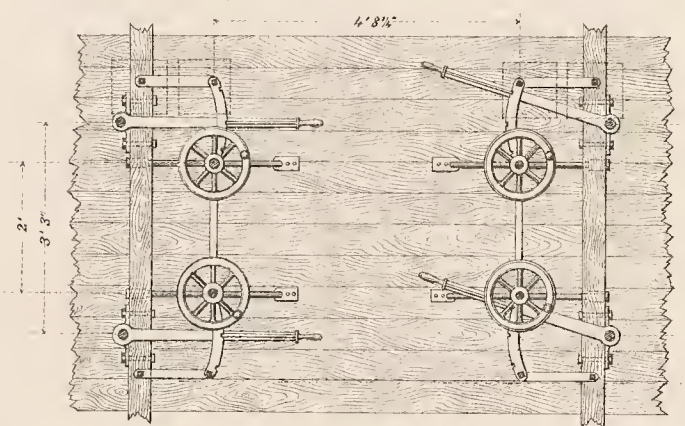
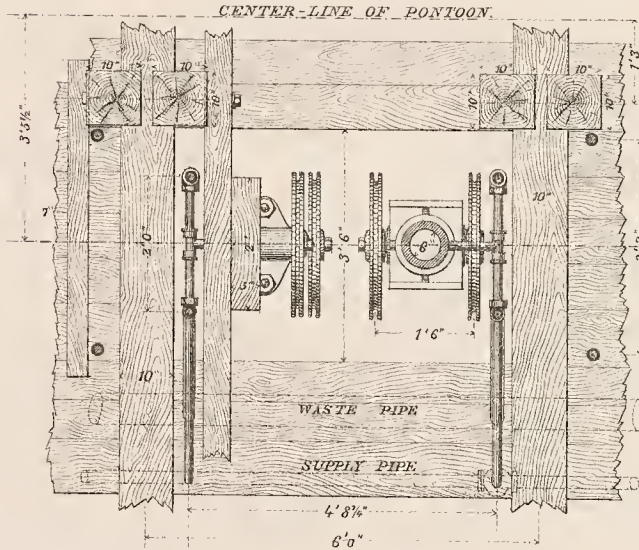


FIG. 5.

FIG. 3.  
CENTER-LINE OF PONTON.

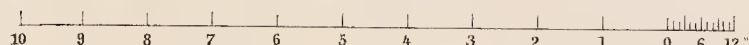


SECTION AB.

SECTION CD.

LOOKING DOWNWARD.

SCALE OF FEET.



SCALE OF METRES.

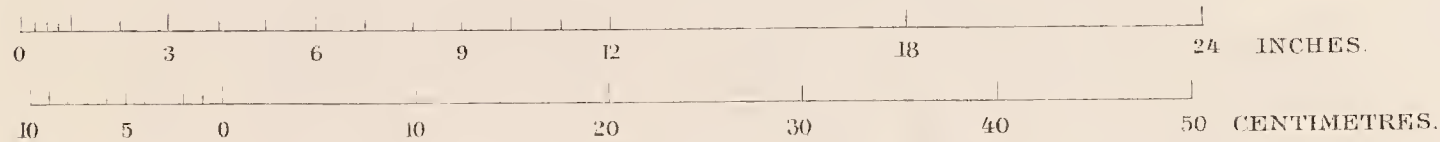






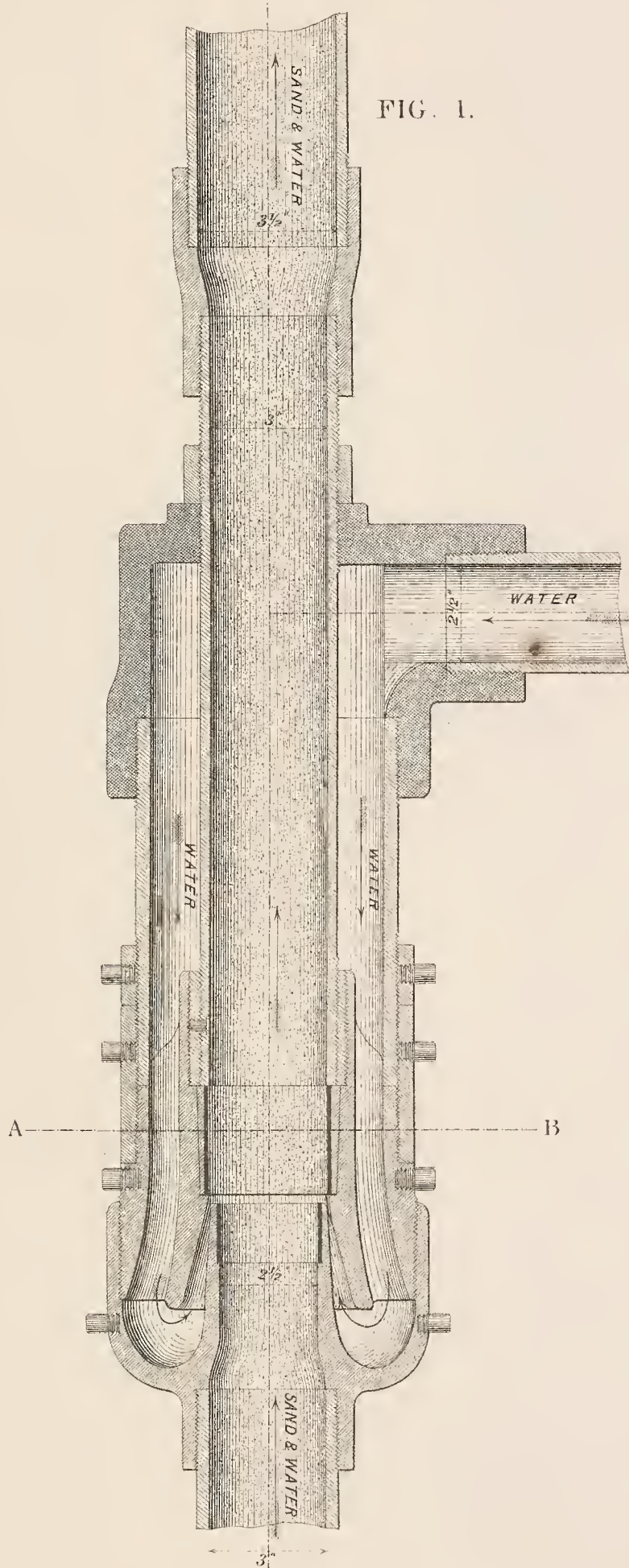


# SANDPUMP.



SECTION CD.

FIG. 1.



SIDE ELEVATION.

FIG. 2.

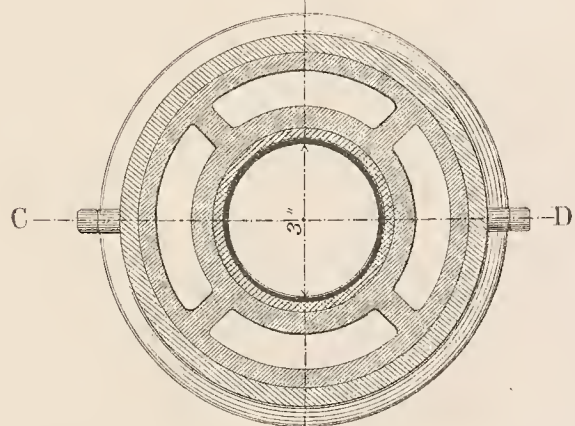
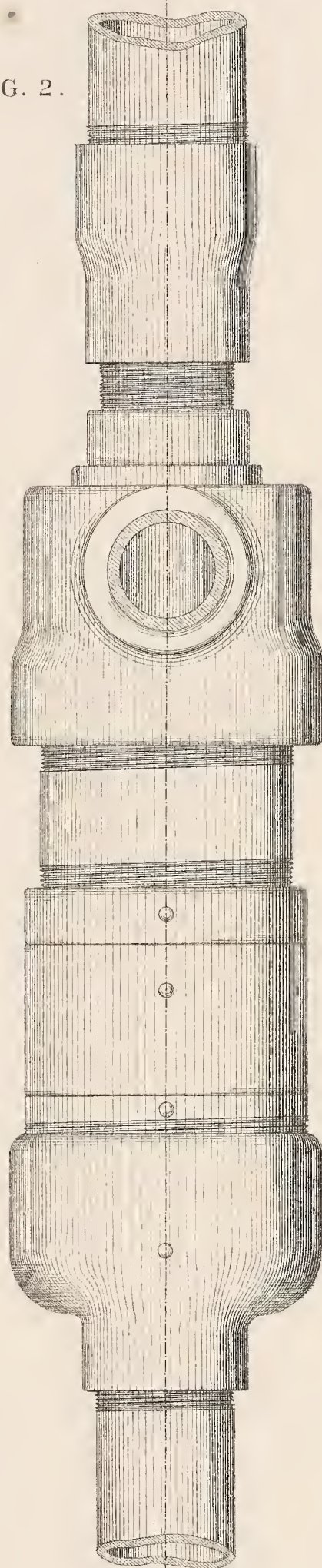


FIG. 3.

SECTION AB.



CHILLED IRON.



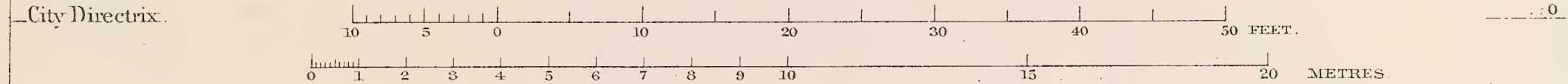


# SECTION OF EAST PIER AND CAISSON

ON LINE AB, PLATE VII.

SHOWING THE INTERIOR OF THE MAIN ENTRANCE SHAFT AND AIR CHAMBER  
AND THE WORKING OF ONE OF THE SAND PUMPS.

Extreme High Water. +7.58



- A. Air Locks.

B. Air Chamber.

C. Timber Girder.

D. Discharge of Sand Pump.

E. Sand Pumps.
- F. Main Entrance Shaft.

G. Side Shafts.

H. Iron Envelope.

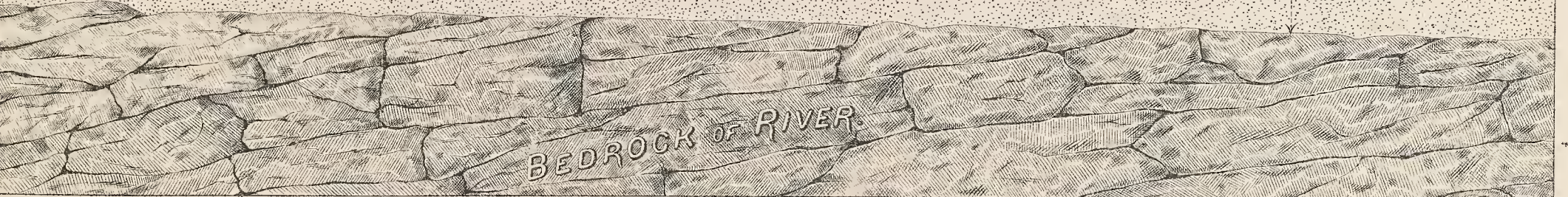
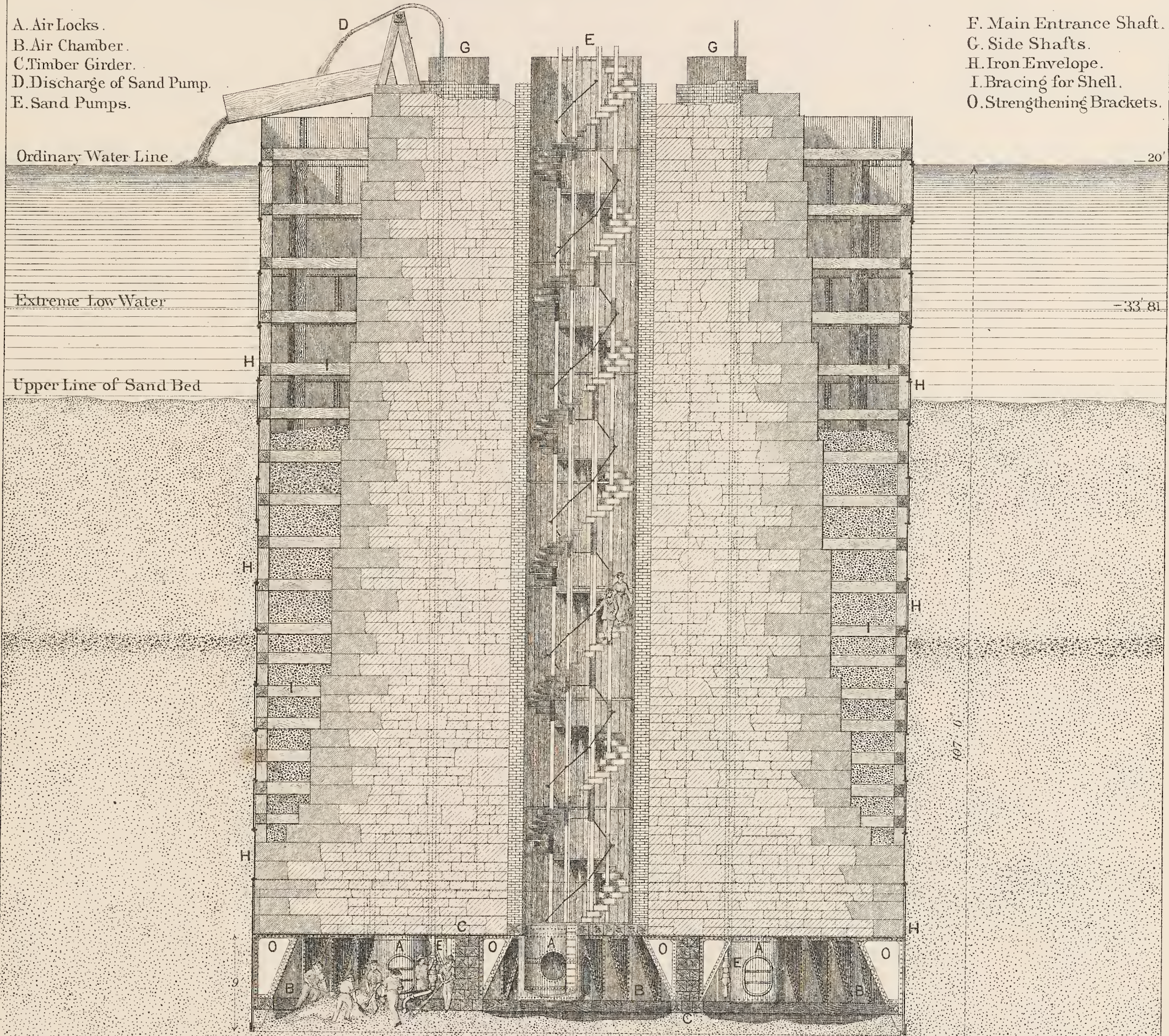
I. Bracing for Shell.

O. Strengthening Brackets.

Ordinary Water Line. -20'

Extreme Low Water. -33.81

Upper Line of Sand Bed





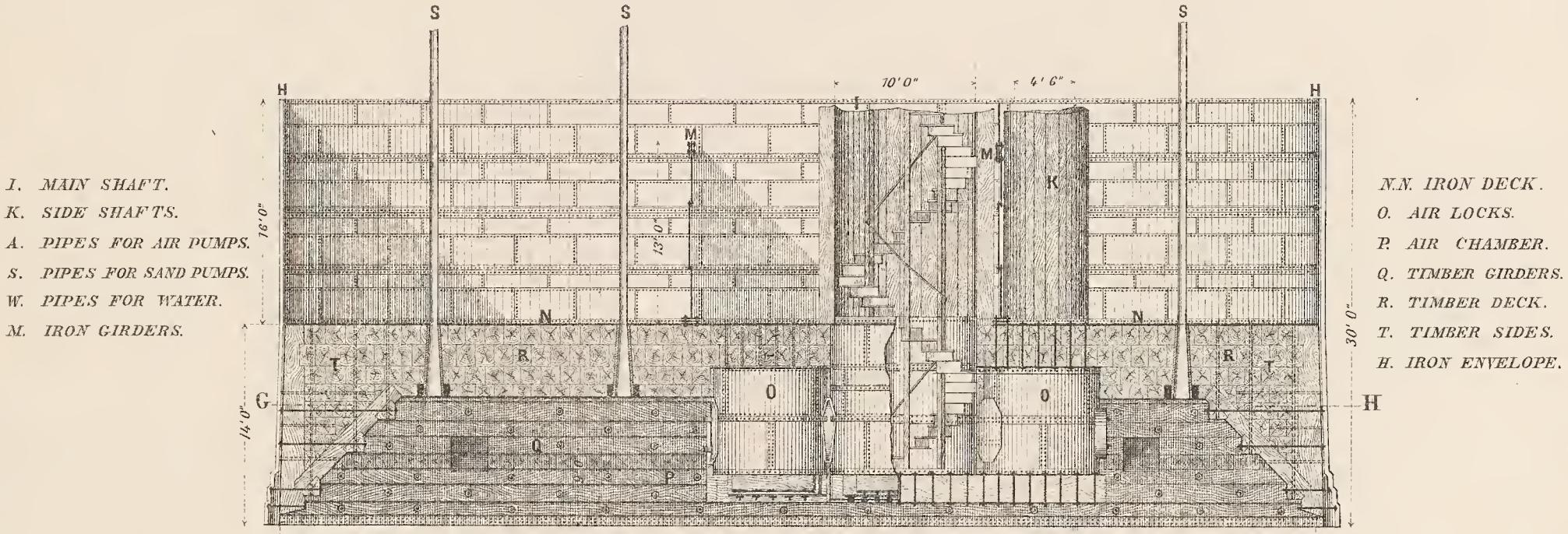




CAISSON FOR EAST ABUTMENT.

FIG. 1.

SECTION OF CAISSON ALONG LINE AB.



I. MAIN SHAFT.  
K. SIDE SHAFTS.  
A. PIPES FOR AIR PUMPS.  
S. PIPES FOR SAND PUMPS.  
W. PIPES FOR WATER.  
M. IRON GIRDERS.

N. IRON DECK.  
O. AIR LOCKS.  
P. AIR CHAMBER.  
Q. TIMBER GIRDERS.  
R. TIMBER DECK.  
T. TIMBER SIDES.  
H. IRON ENVELOPE.

TOP - VIEW  
OF  
CAISSON.

EAST SIDE.  
SECTION  
ALONG  
LINE GH.

FIG. 2.

WEST SIDE.  
RIVER FRONT.

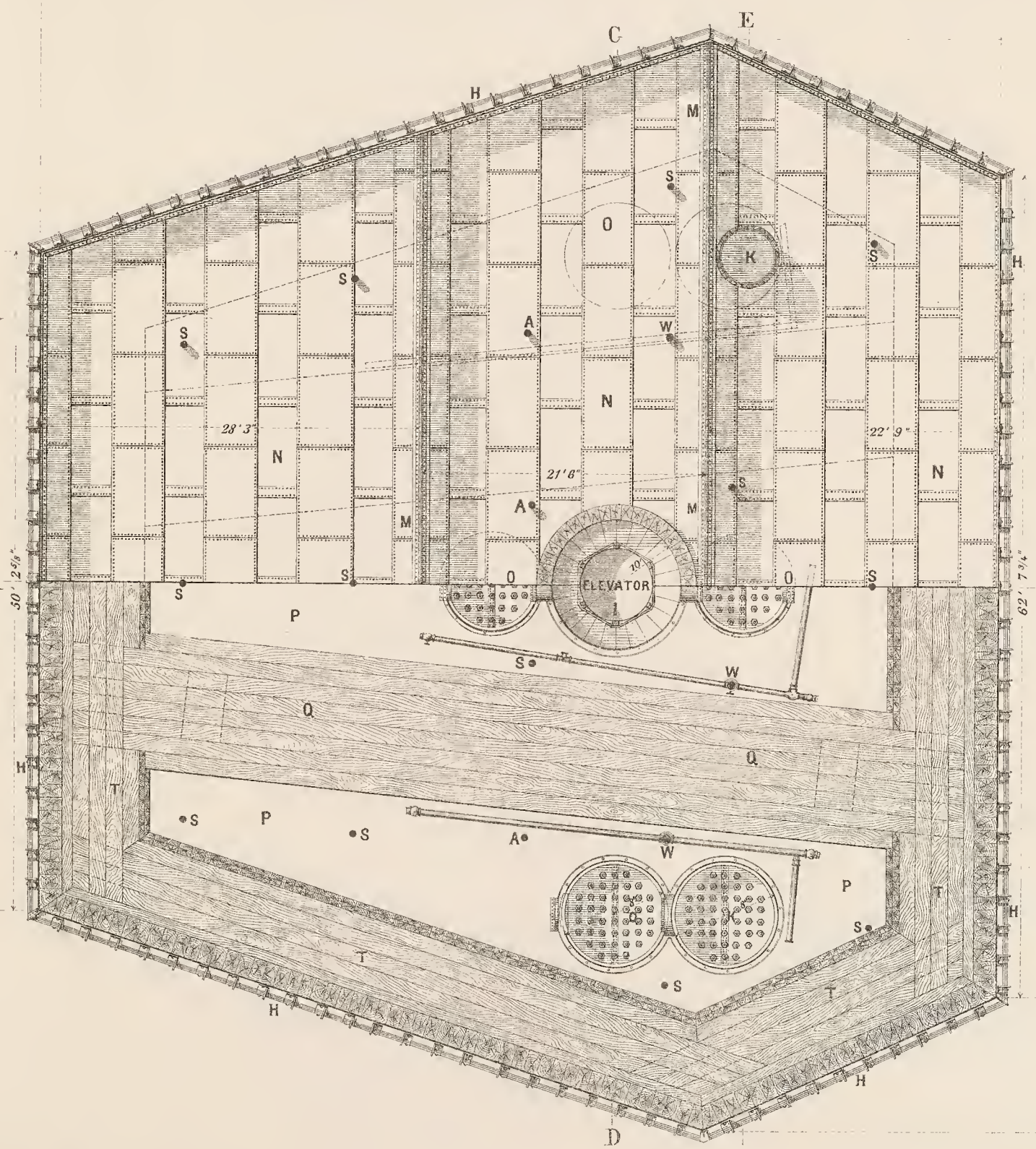
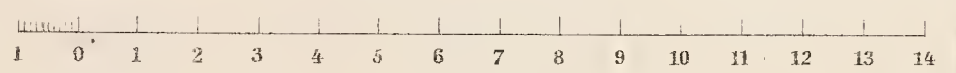
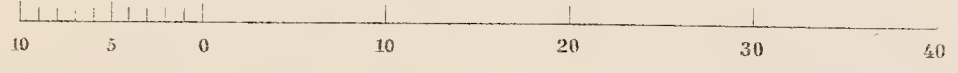


FIG. 3.

SCALE OF FEET.

SCALE OF METRES.









# CAISSON FOR EAST ABUTMENT.

FIG. 1.

FIG. 2.

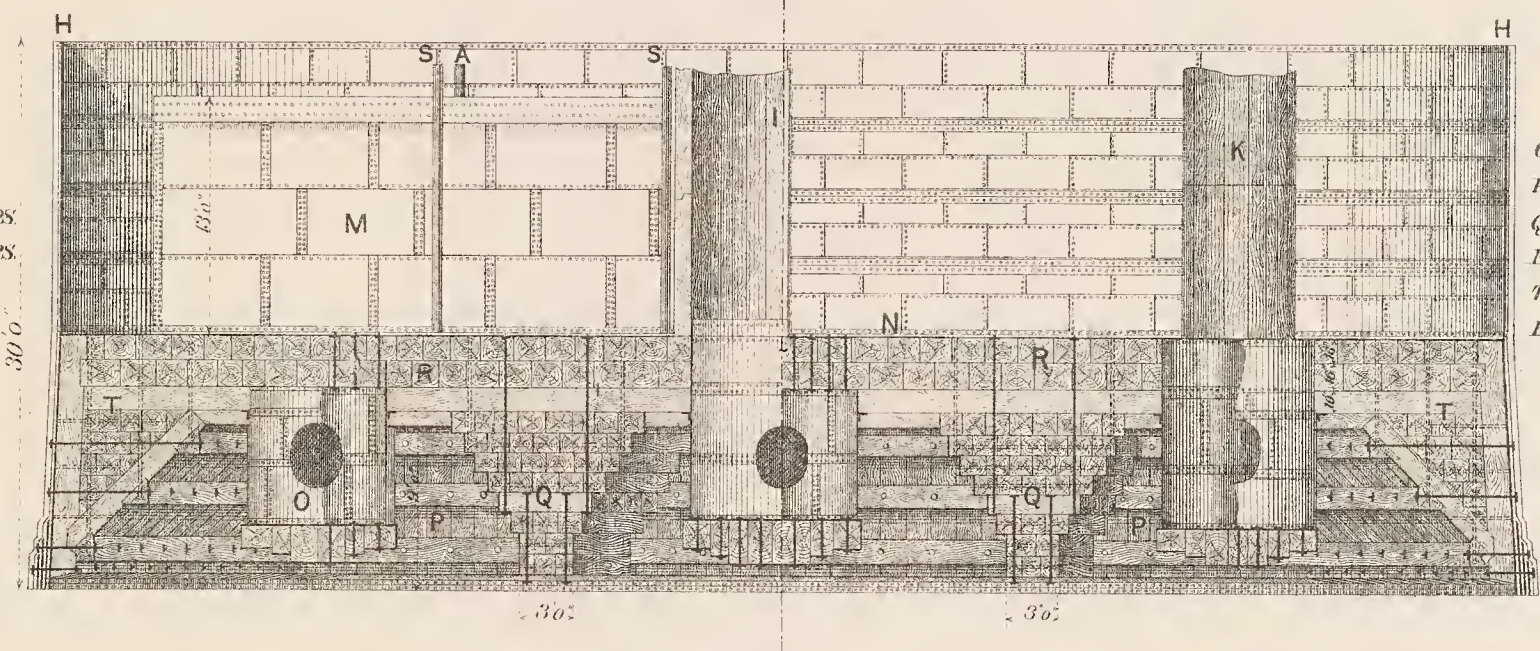
## SECTION OF CAISSON

ALONG LINE C D,  
( Plate VII )  
LOOKING EASTWARD.

ALONG LINE E F.  
( Plate VII )  
LOOKING WESTWARD.

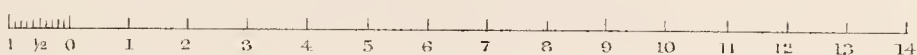
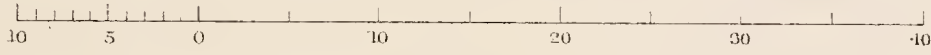
L. MAIN SHAFT.  
K. SIDE SHAFTS.  
A. PIPES FOR AIR PUMPS.  
S. PIPES FOR SAND PUMPS.  
W. PIPES FOR WATER.  
M. IRON GIRDERS.  
N. IRON DECK.

O. AIR LOCKS.  
P. AIR CHAMBER.  
Q. TIMBER GIRDERS.  
R. TIMBER DECK.  
T. TIMBER SIDES.  
H. IRON ENVELOPE.



SCALE OF FEET.

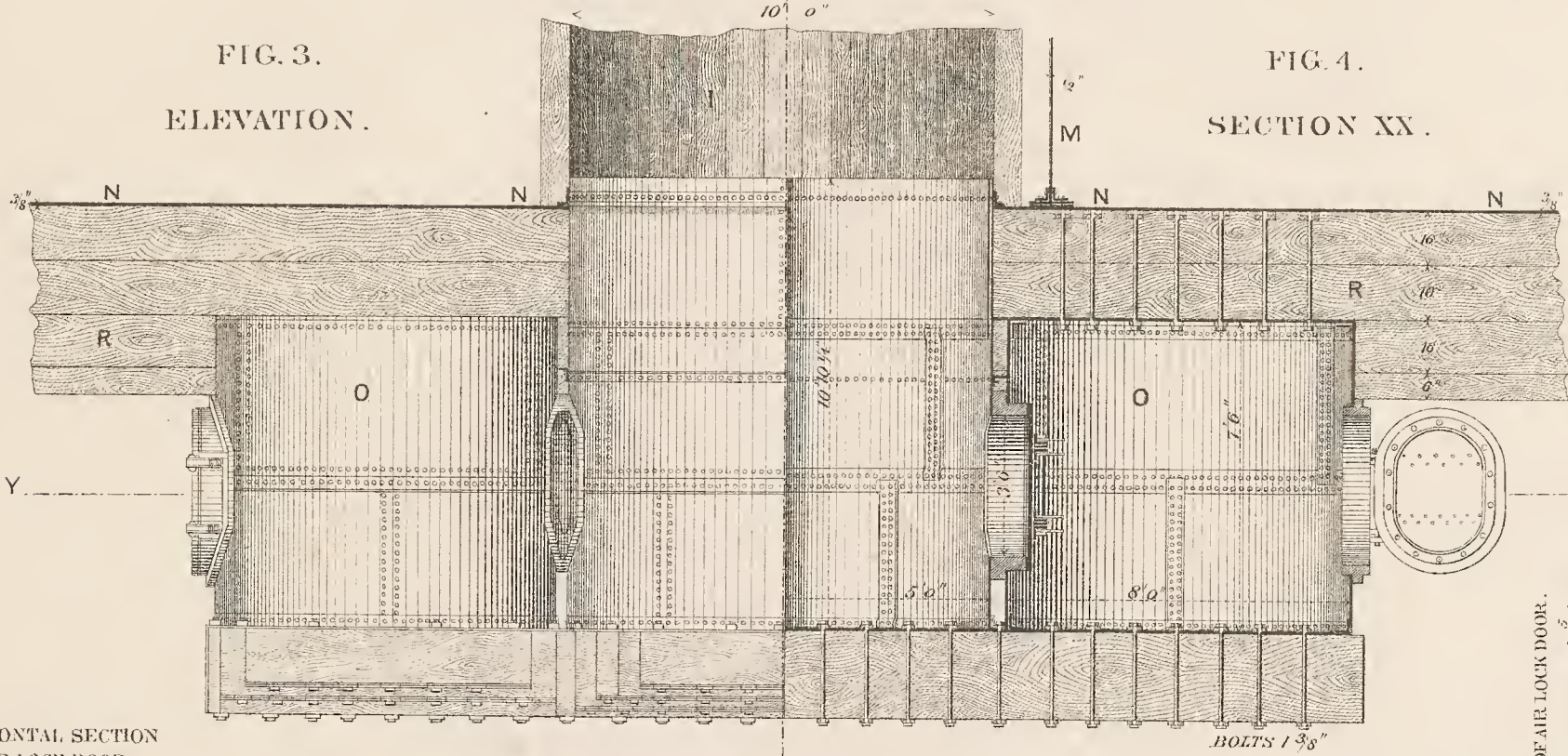
SCALE OF METRES.



## CENTRAL AIR LOCKS.

FIG. 3.  
ELEVATION.

FIG. 4.  
SECTION XX.



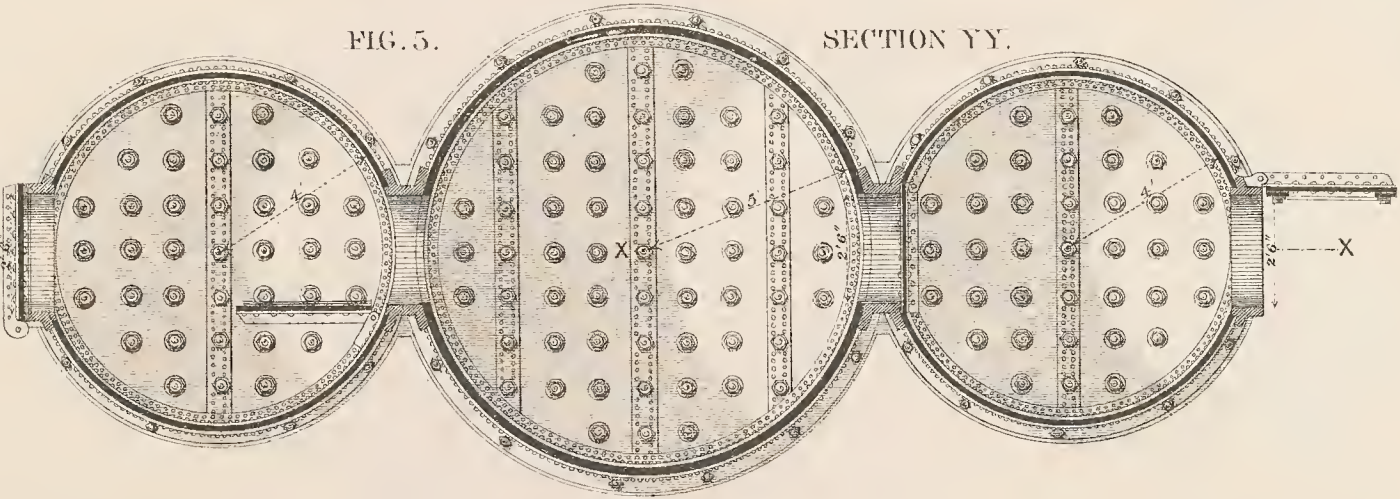
HORIZONTAL SECTION  
OF AIR LOCK DOOR.



FIG. 7.  
( DOUBLE SCALE )  
SEEN FROM BELOW.

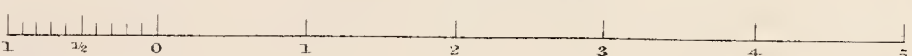
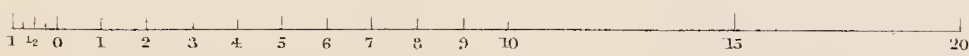
FIG. 5.

SECTION YY.



SCALE OF FEET.

SCALE OF METRES.



VERTICAL SECTION OF AIR LOCK DOOR.

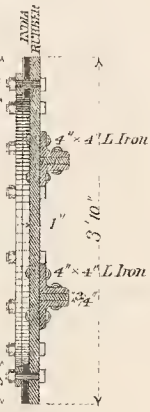


FIG. 6.  
( DOUBLE SCALE )



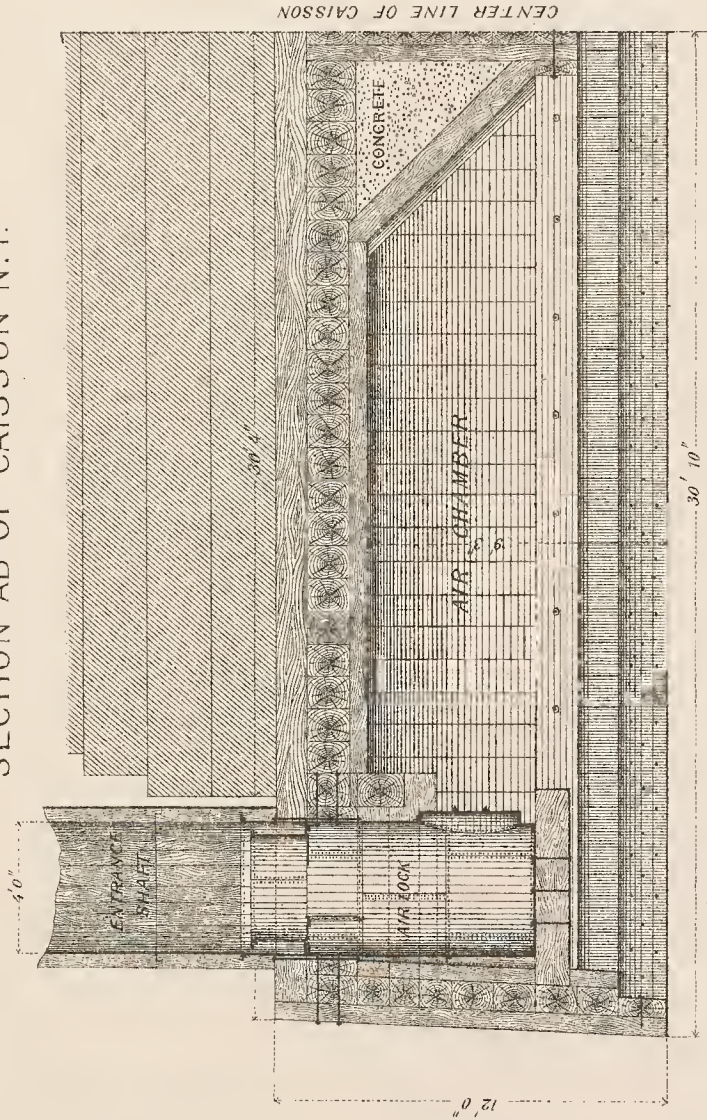




# CAISSONS FOR PIERS OF EAST APPROACH.

FIG. 1.

SECTION AB OF CAISSON N° I.



THE OTHER HALF OF CAISSON IS SYMMETRICAL.

FIG. 3

VIEW OF CAISSON N° I FROM BELOW.

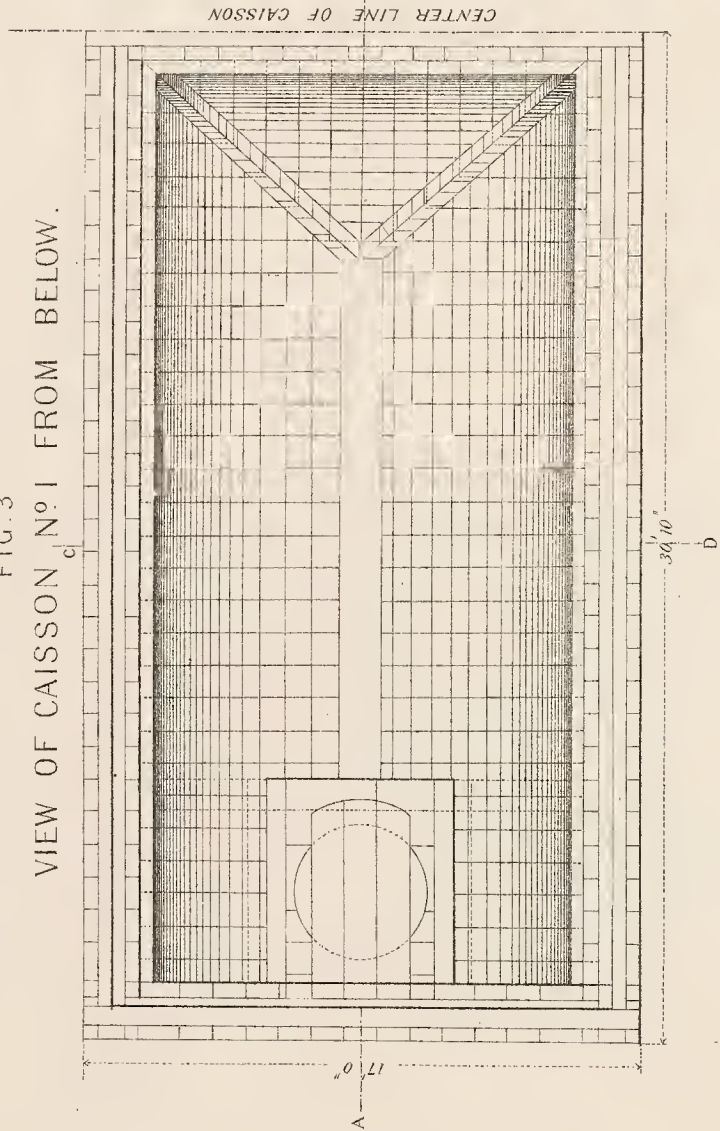
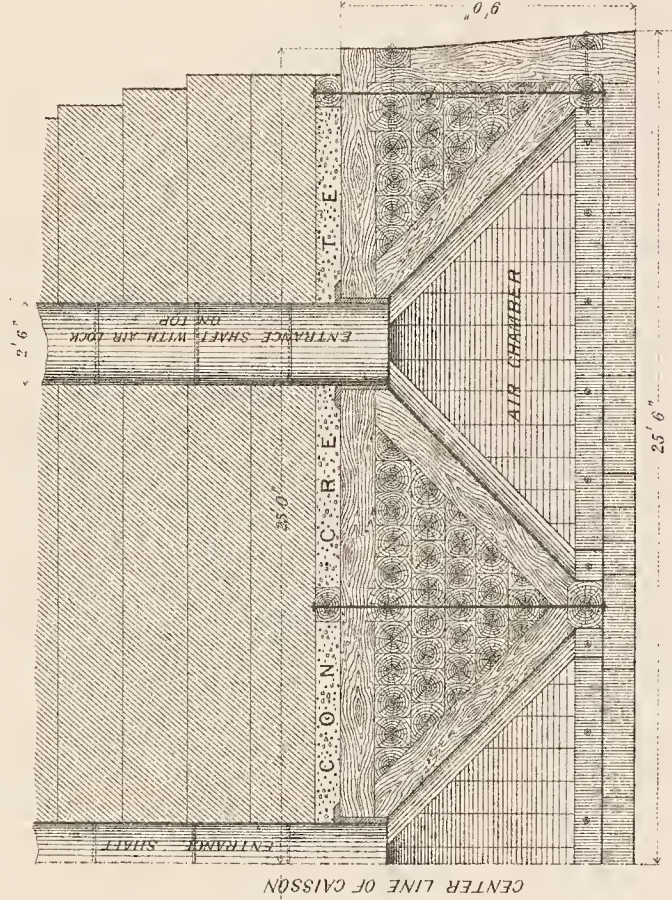


FIG. 4.

SECTION GH OF CAISSON N° II.



THE OTHER HALF OF CAISSON IS SYMMETRICAL.

FIG. 5.

VIEW OF CAISSON N° II FROM BELOW.

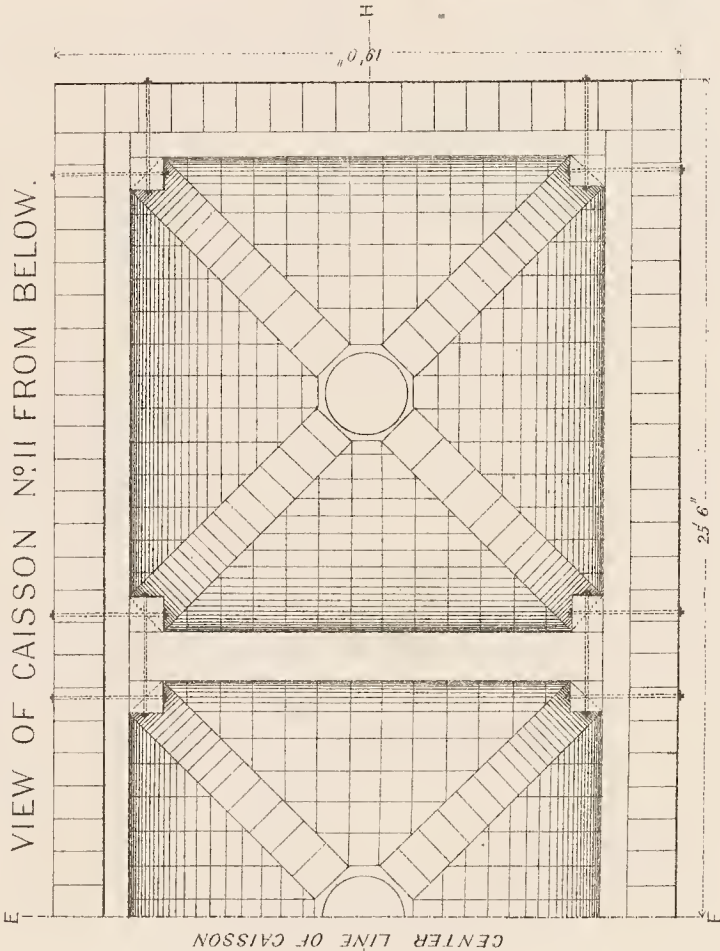


FIG. 2.

SECTION CD OF CAISSON N° I.

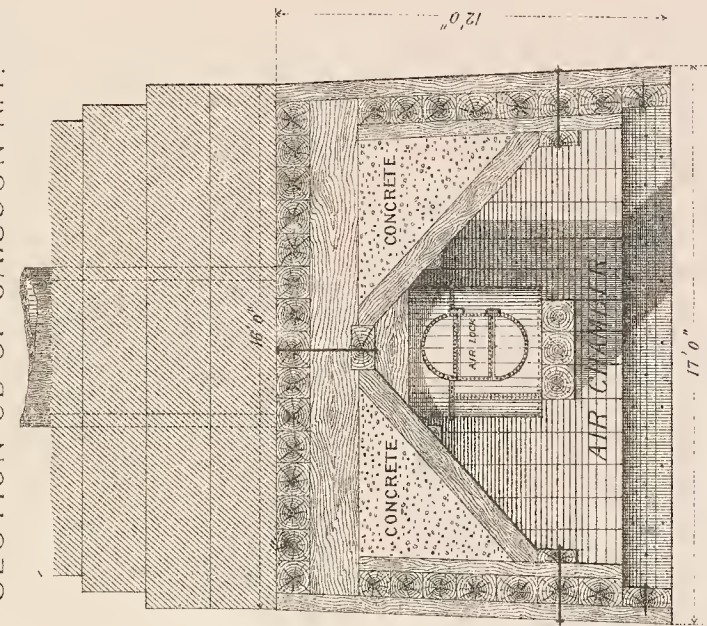
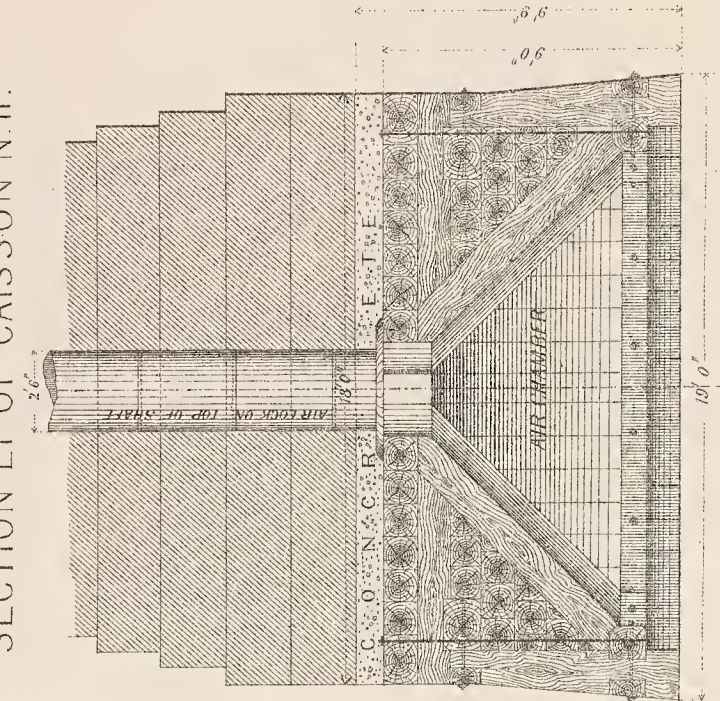
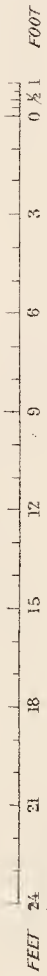


FIG. 6.

SECTION EF OF CAISSON N° II.



SCALE OF FEET



SCALE OF METRES



CAISSON I WAS USED AT APPROACH PIERS N° 1, 2 & 4.  
CAISSON II WAS USED AT APPROACH PIER N° 3.







# ABUTMENT AND WEST APPROACH.

FIG. 1.  
ELEVATION.

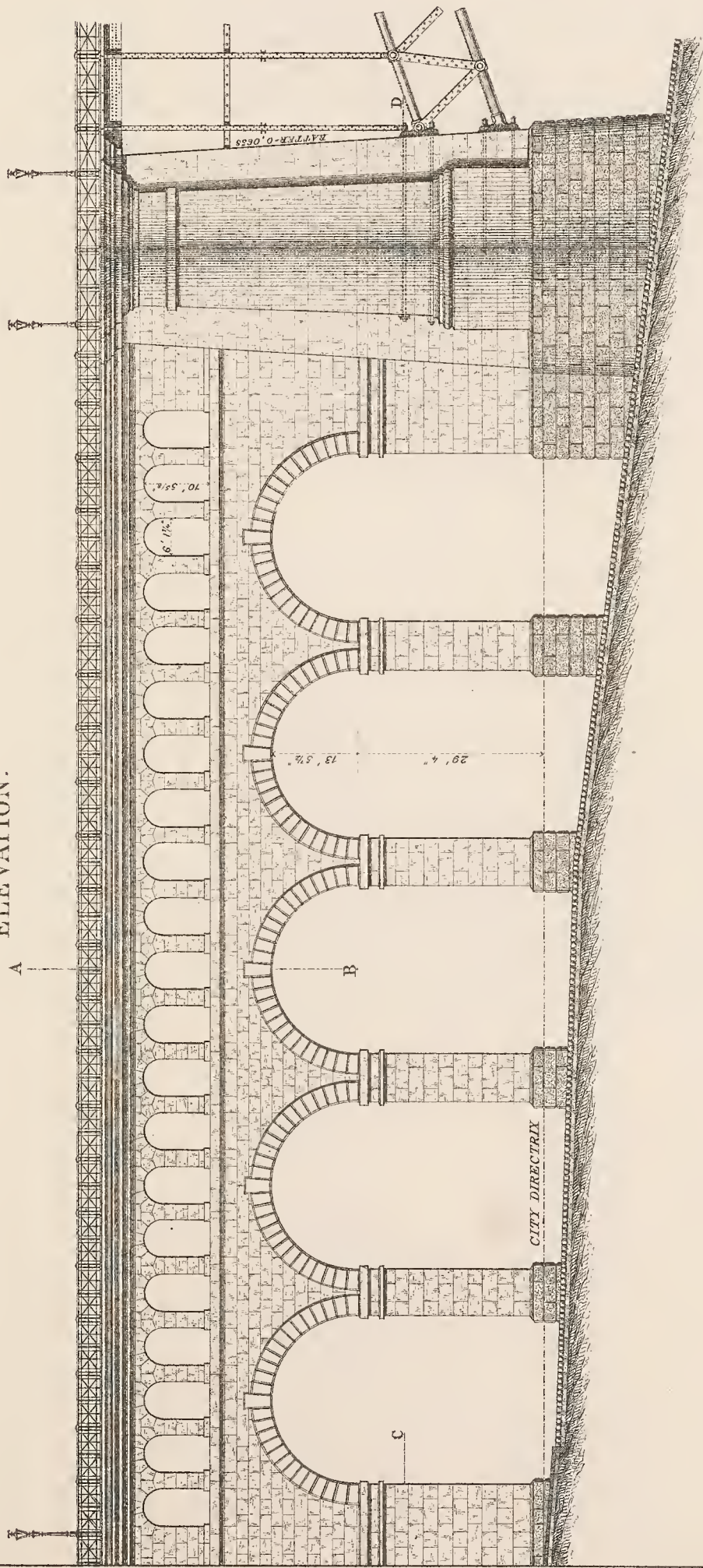


FIG. 2.  
SIDE VIEW.

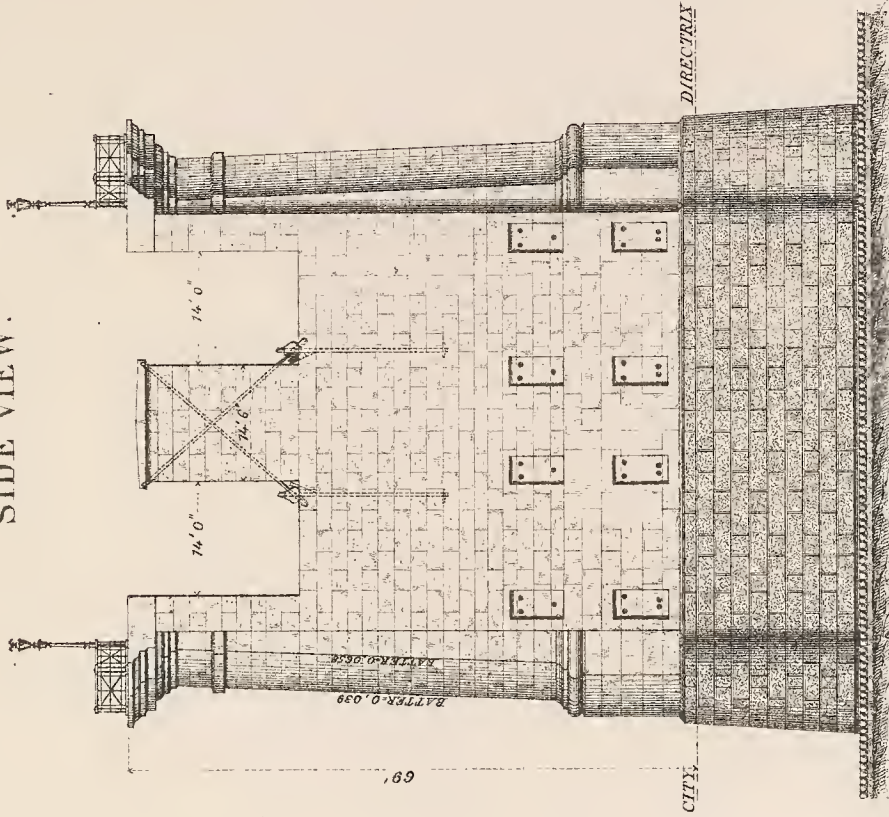


FIG. 3.  
SECTION CD.

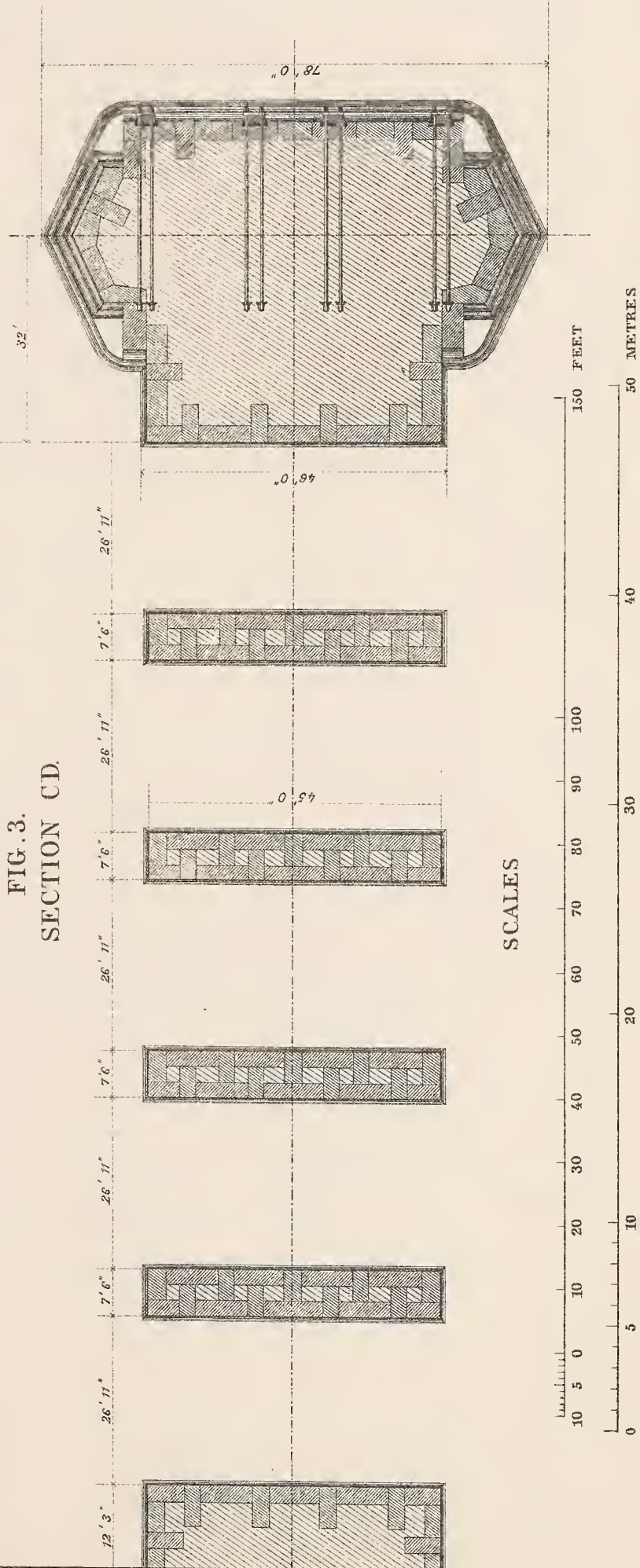
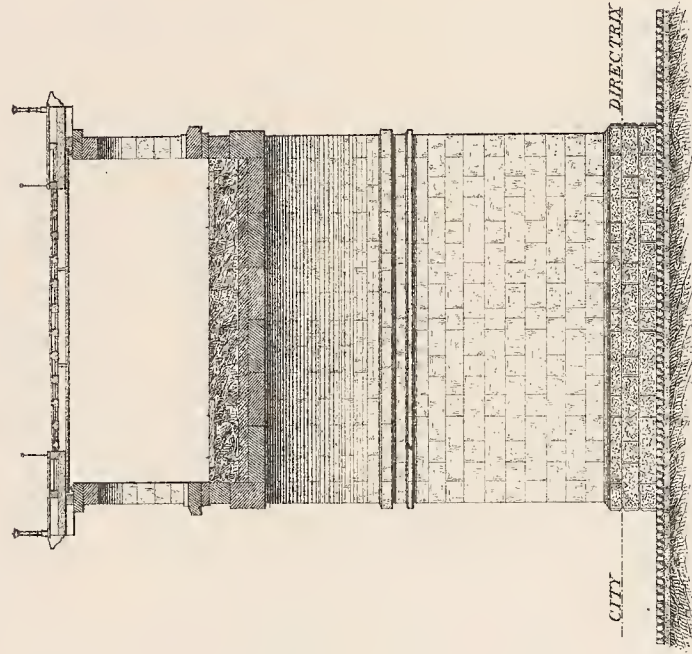


FIG. 4.  
SECTION AB.









EAST PIER.

SCALES

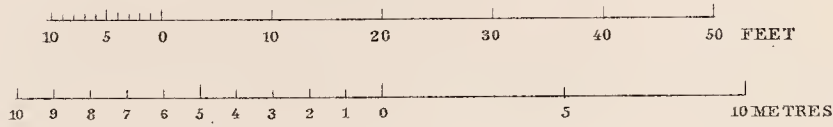


FIG. 1.  
ELEVATION.

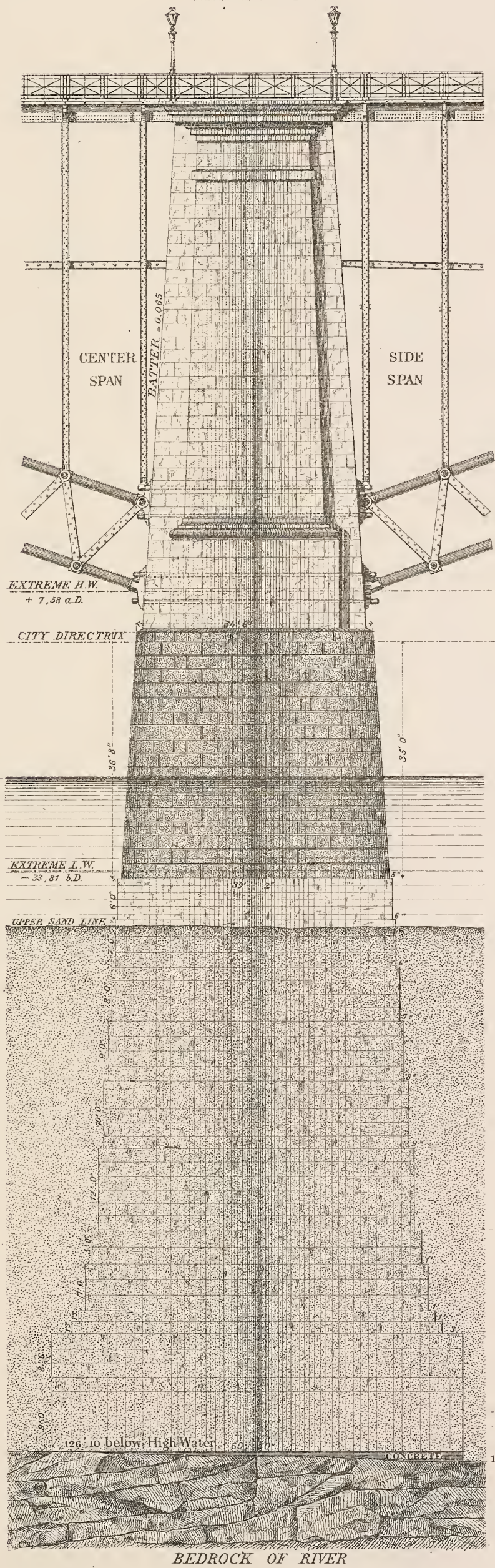
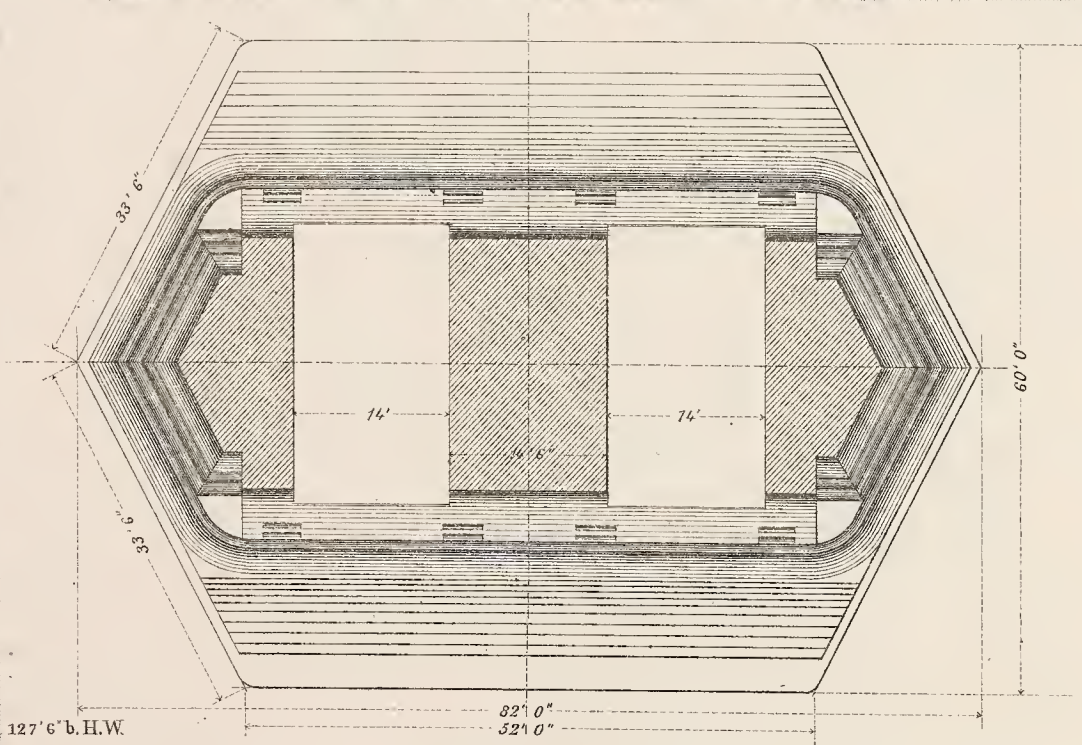
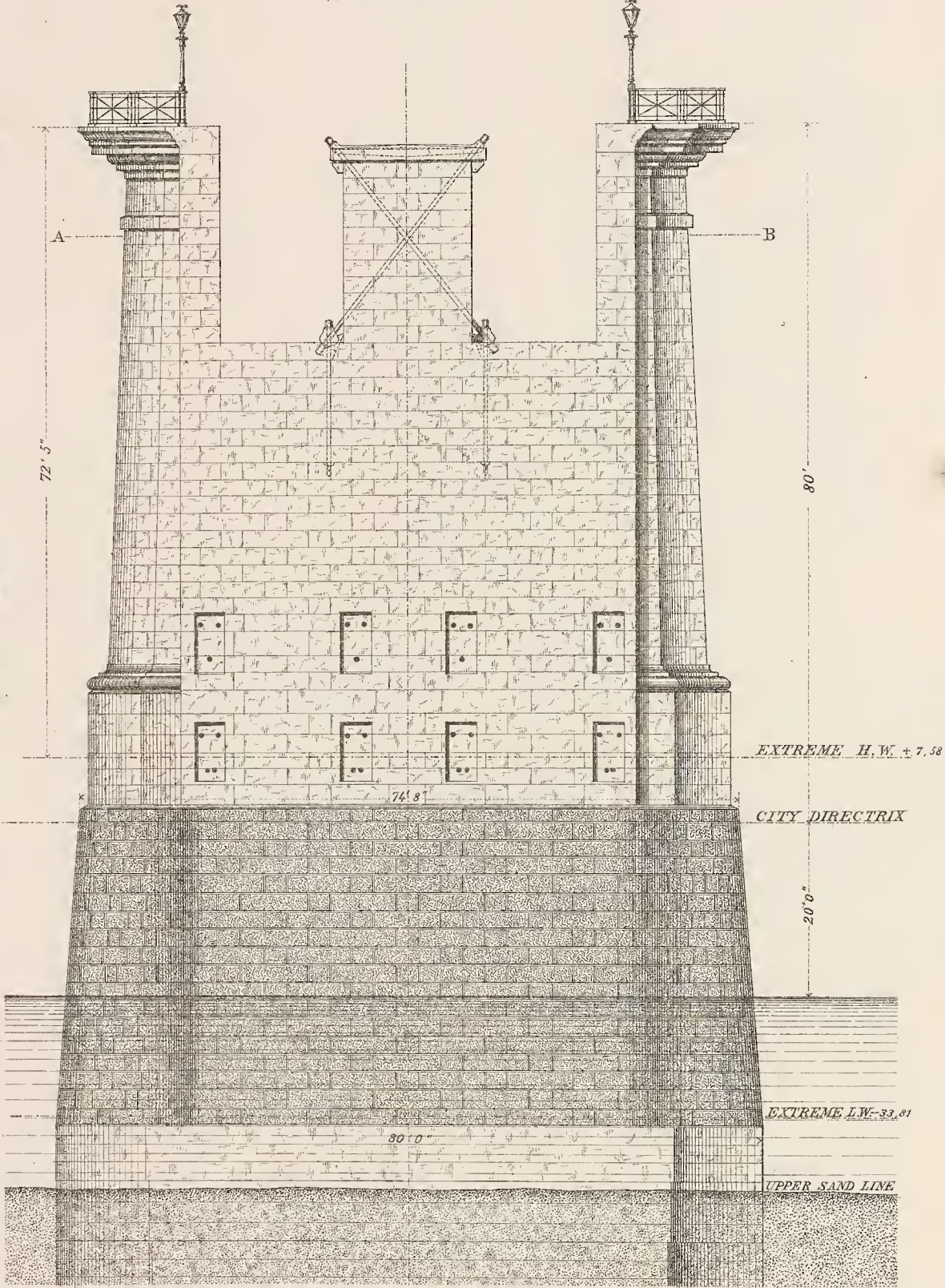


FIG. 2.  
SIDE VIEW.



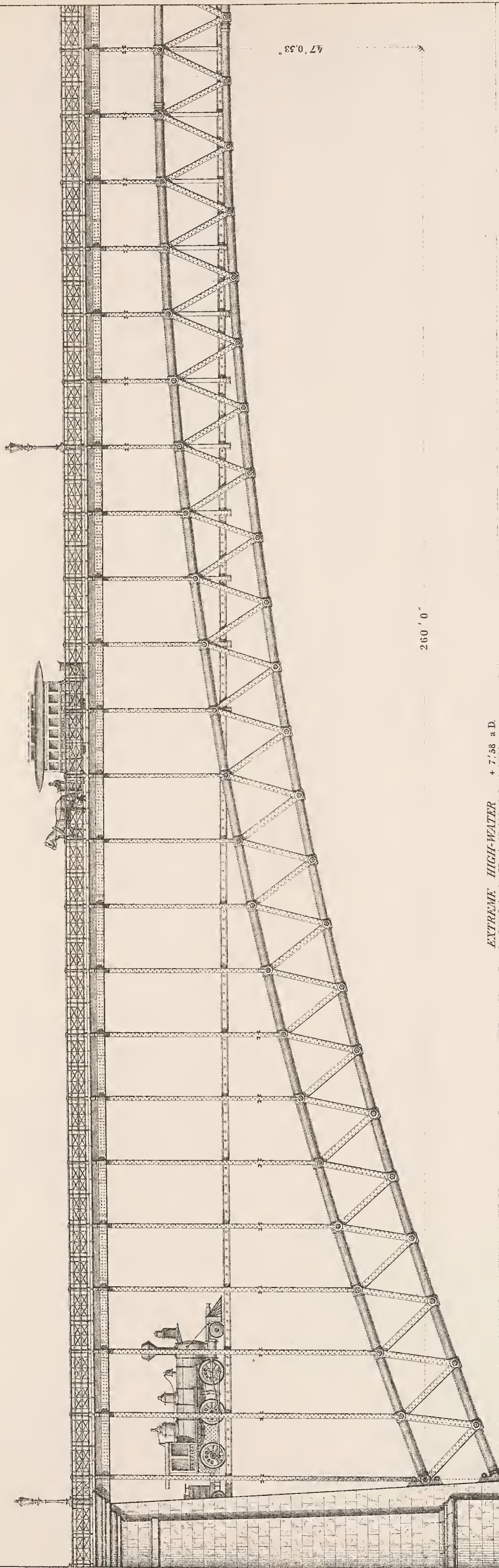
SECTION AB.  
FIG. 3.







ELEVATION OF ONE-HALF OF  
CENTER SPAN.



TOTAL CLEAR SPAN = 520' 0"

EXTREME LOW-WATER = 33' 81" b.D.

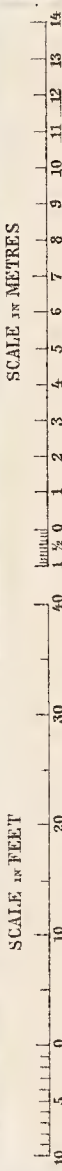


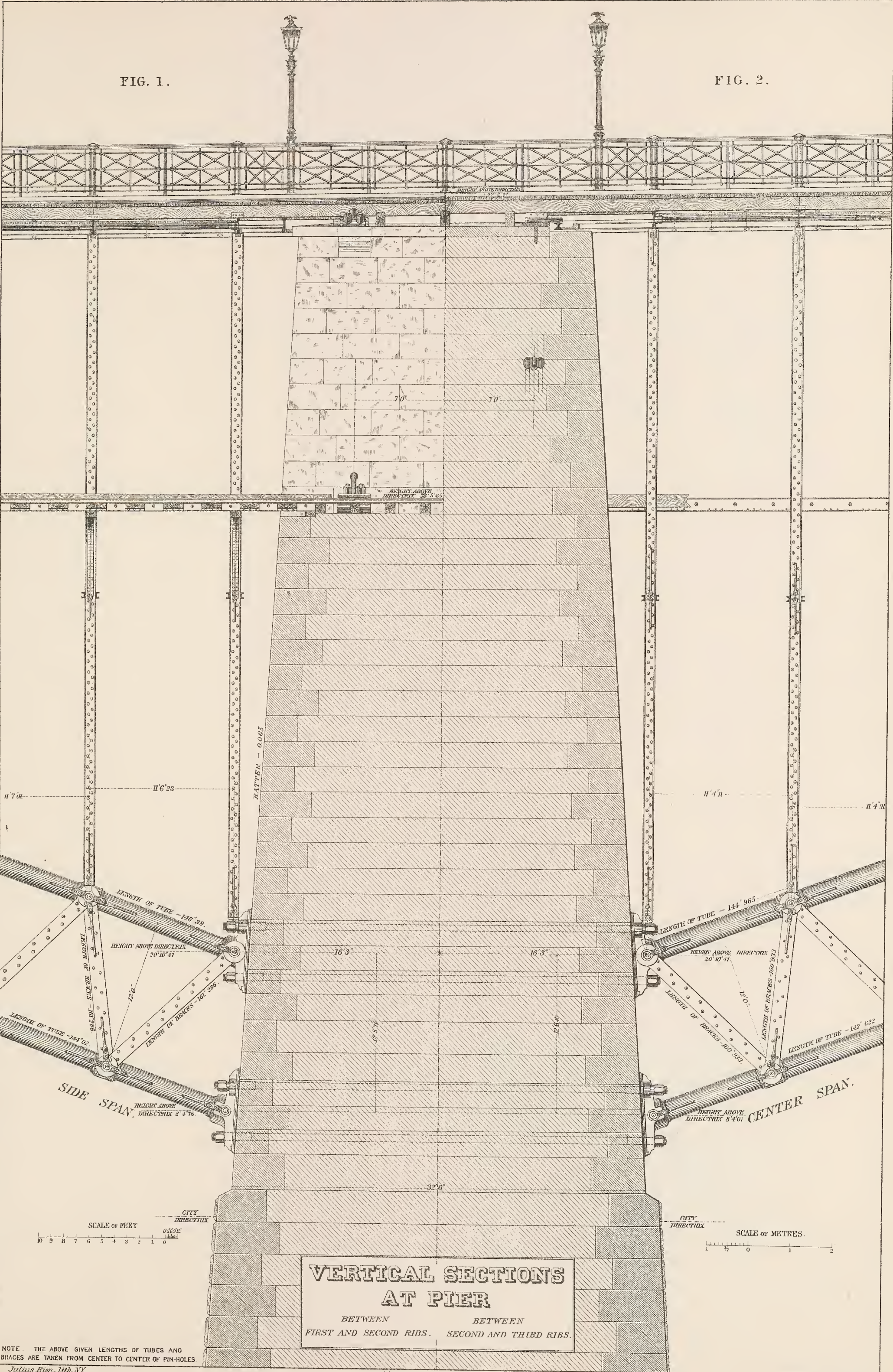






FIG. 1.

FIG. 2.

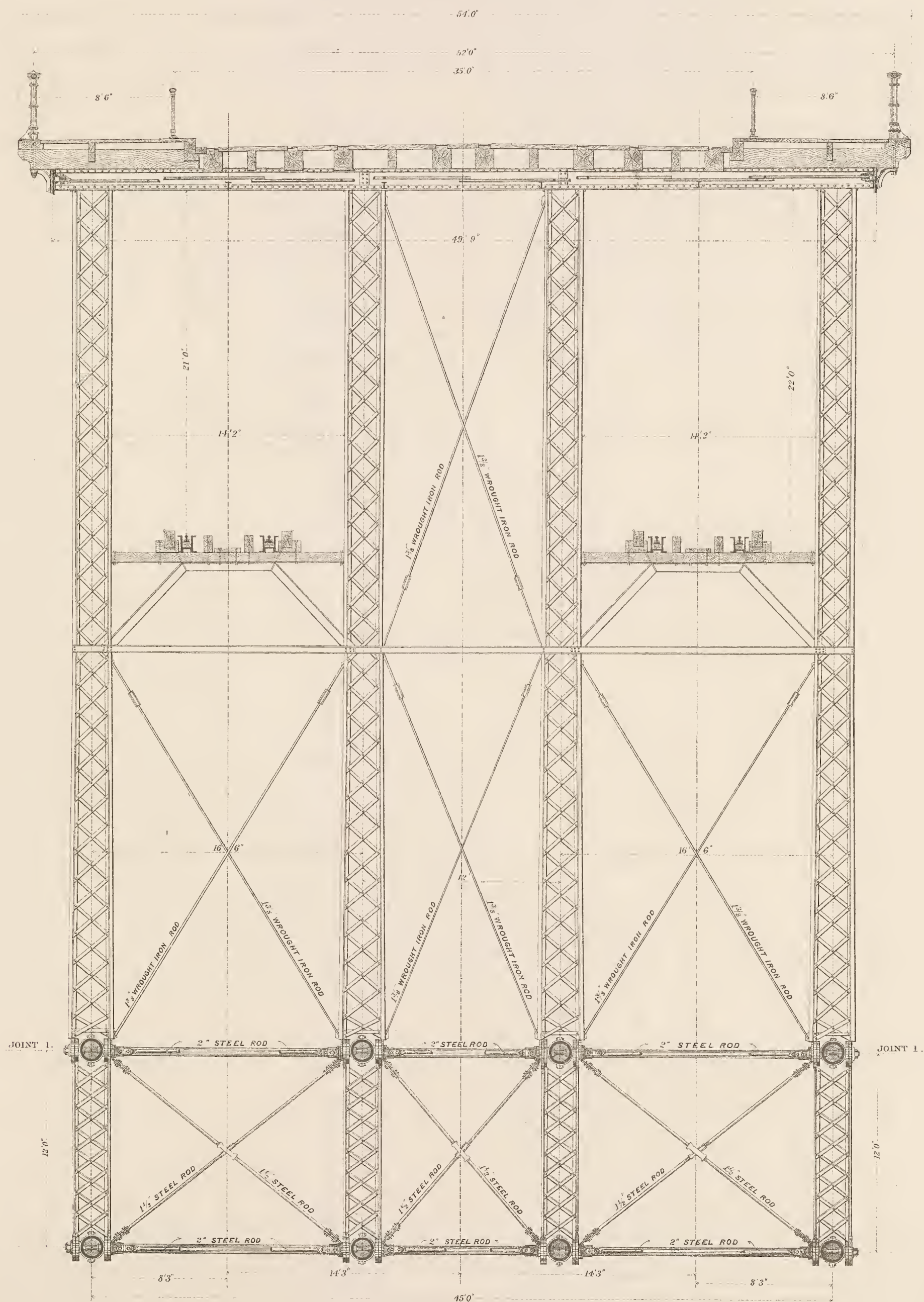








# CROSS SECTION AT JOINT N°1 OF CENTER SPAN.



FOR DETAILS AND DIMENSIONS  
OF JOINT I SEE PLATE XXIV.

SCALE OF FEET.  
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

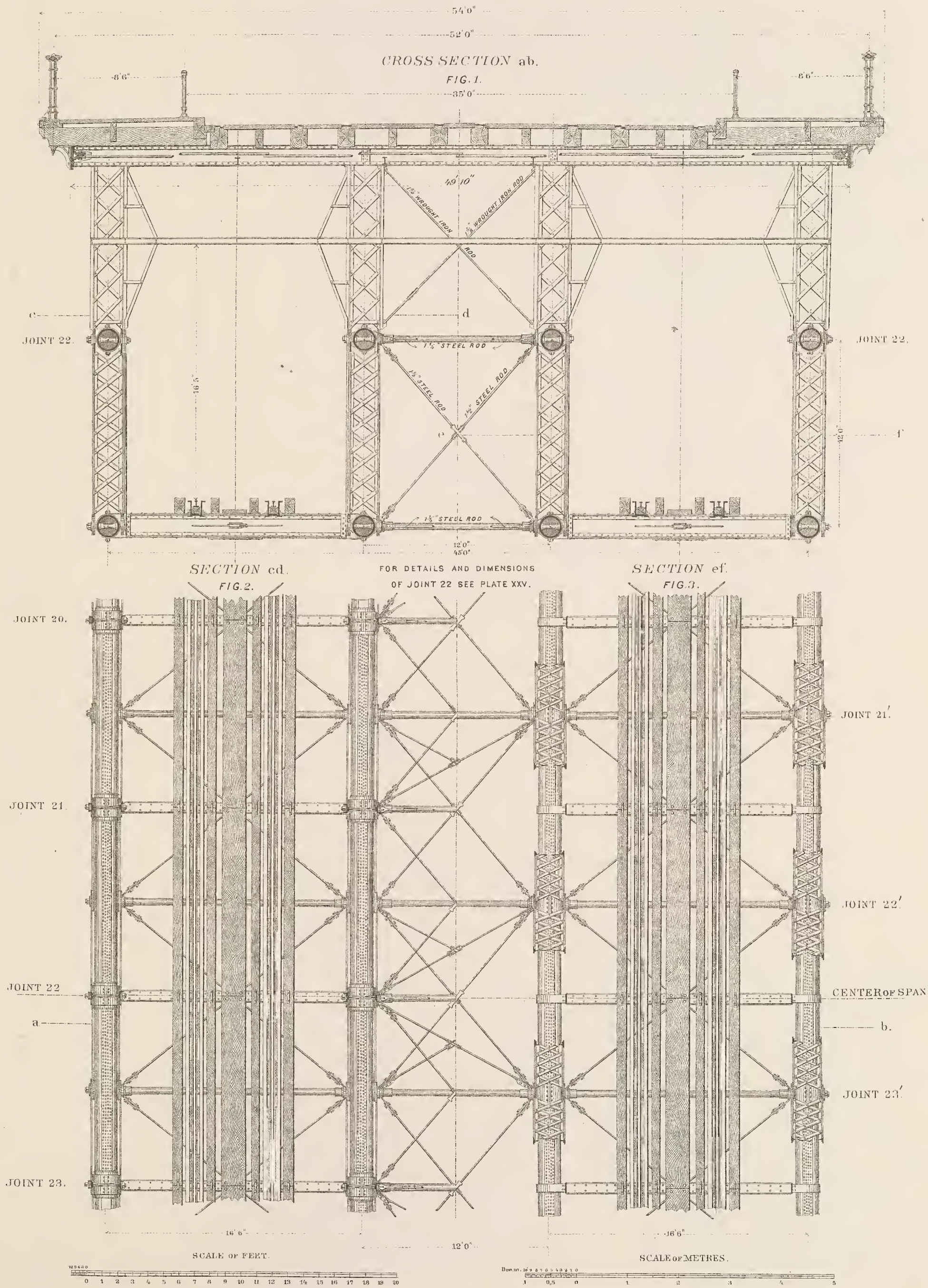
SCALE OF METRES.  
0 0.5 1 2 3 4 5







CROSS SECTION AND HORIZONTAL SECTIONS  
AT CENTER OF CENTER SPAN

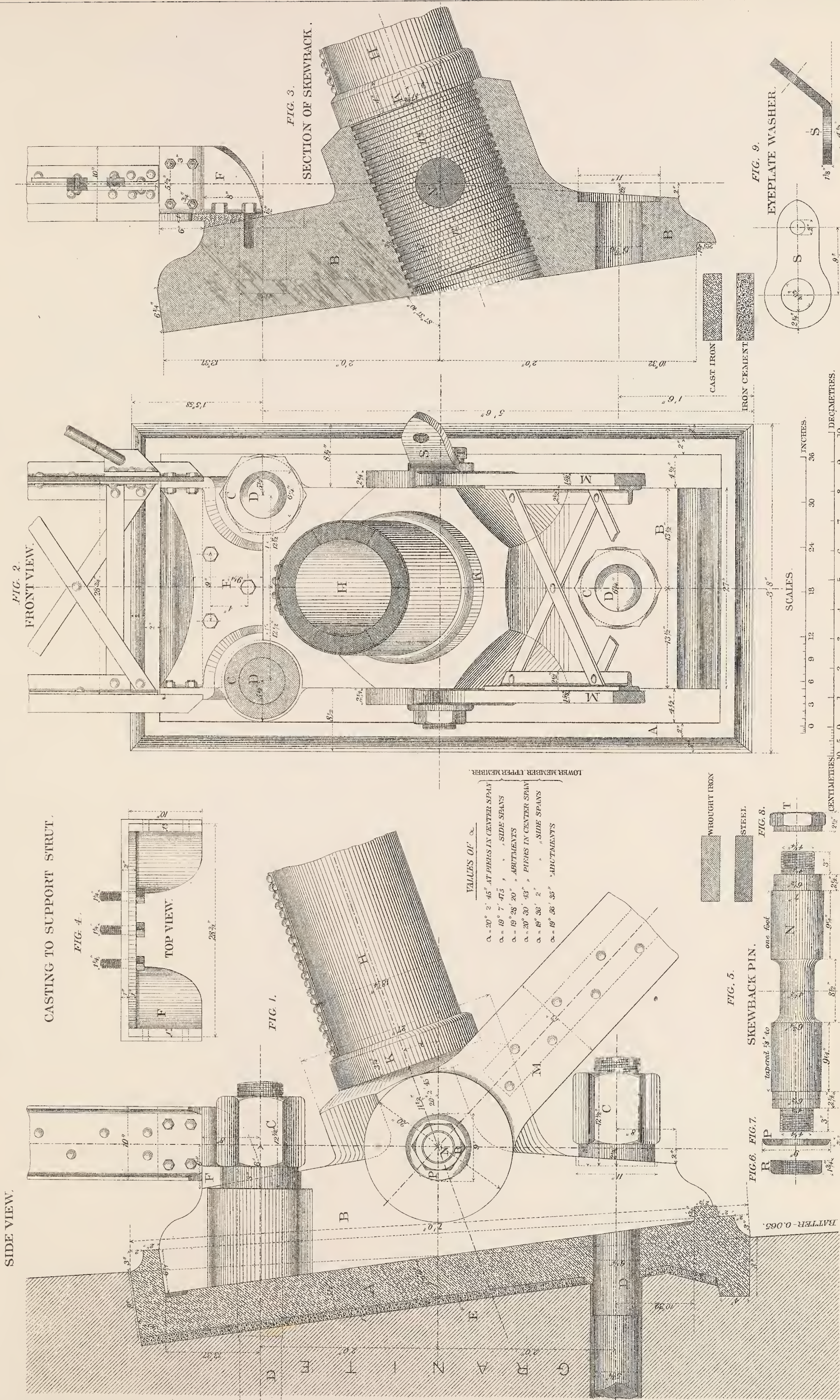








# UPPER SKEWBACK-JOINT









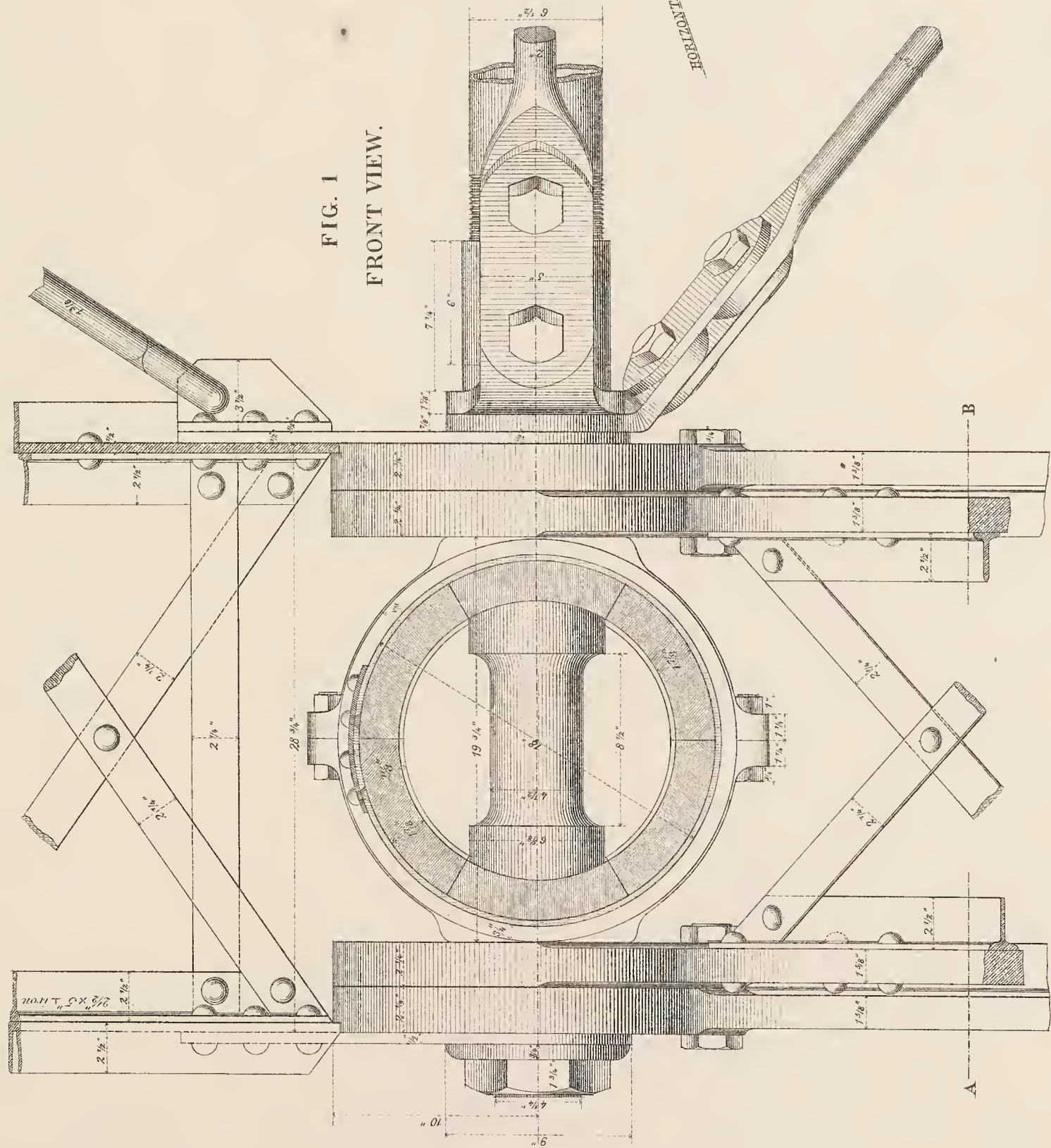


FIG. 1  
FRONT VIEW.

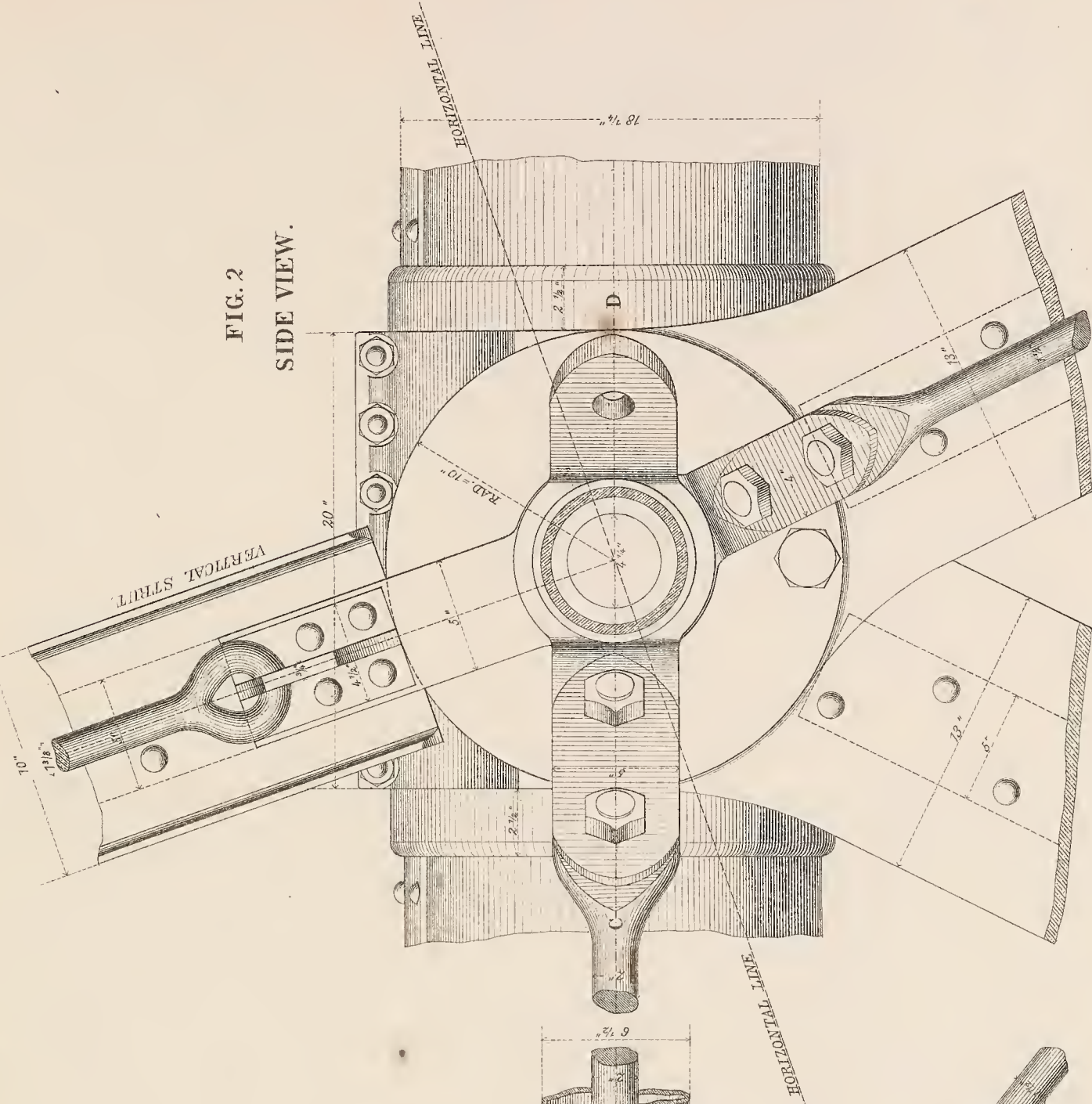


FIG. 2  
SIDE VIEW.

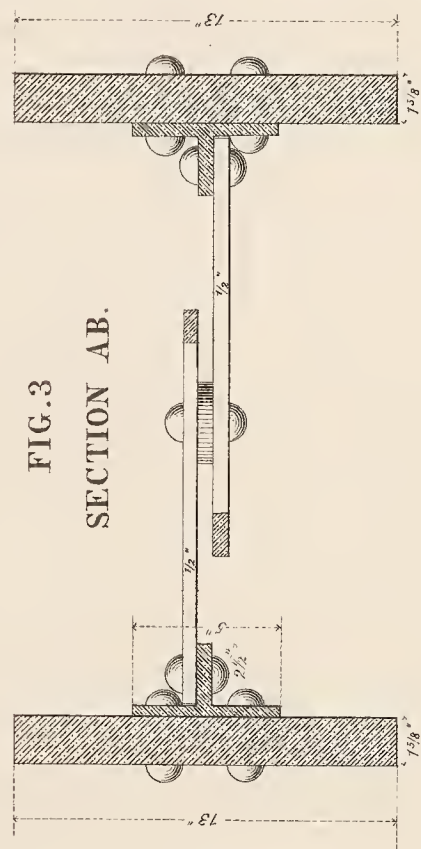


FIG. 3  
SECTION AB.

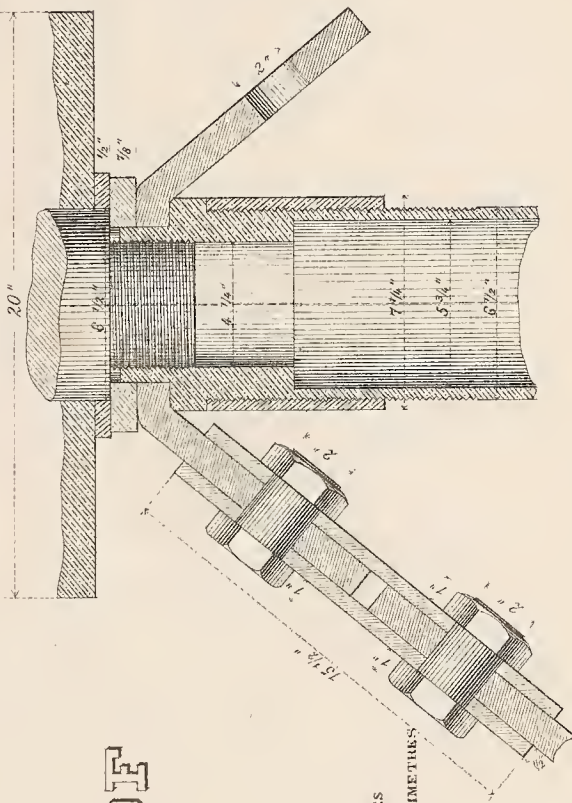
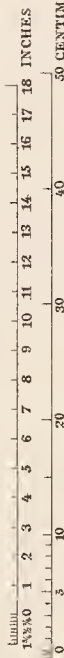


FIG. 4  
SECTION CD.

JOINT 1 OF RIB A OF  
CENTERSPAN.

SCALES.

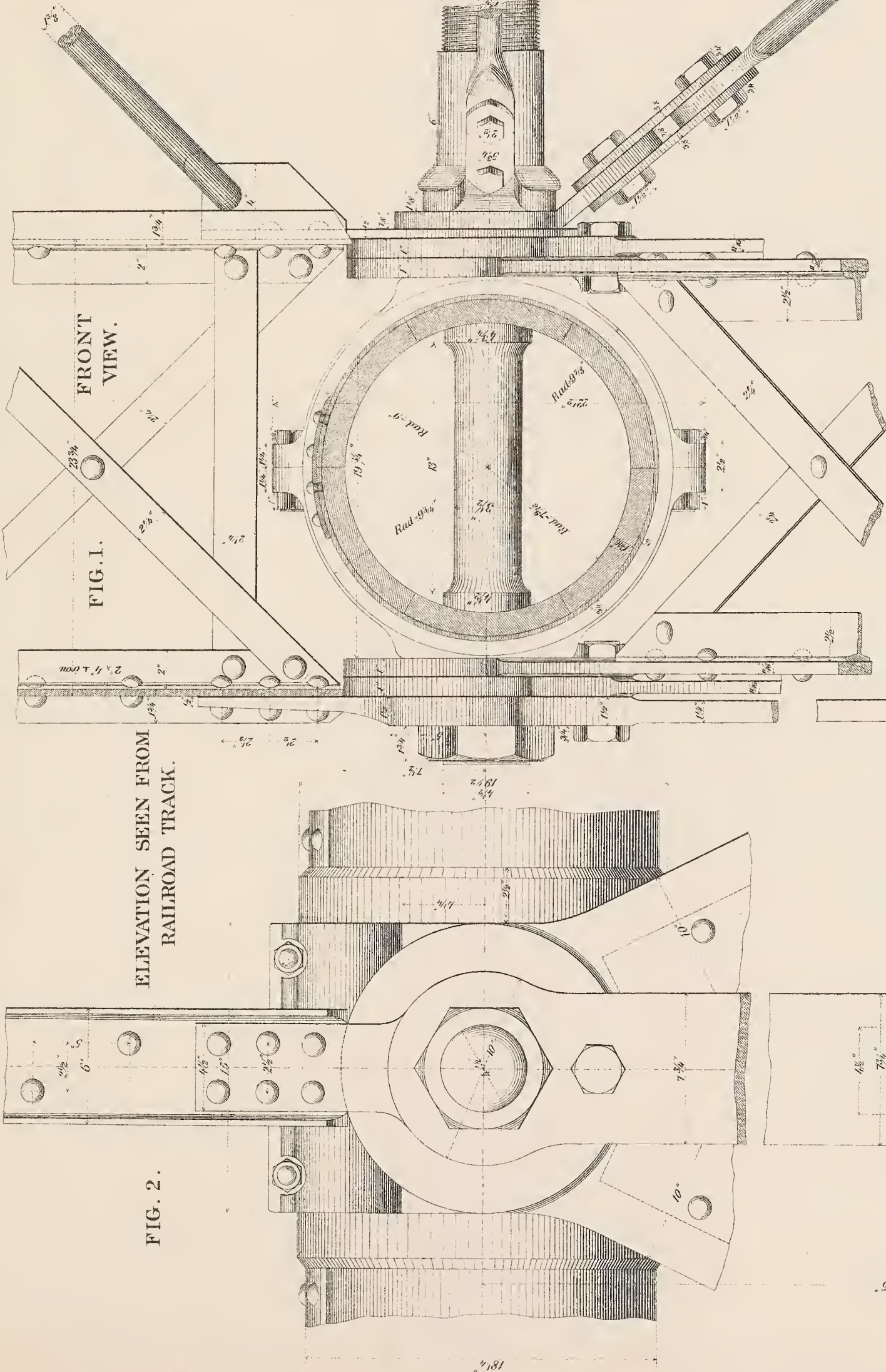


INDICATES STEEL.  
INDICATES WROUGHT IRON.



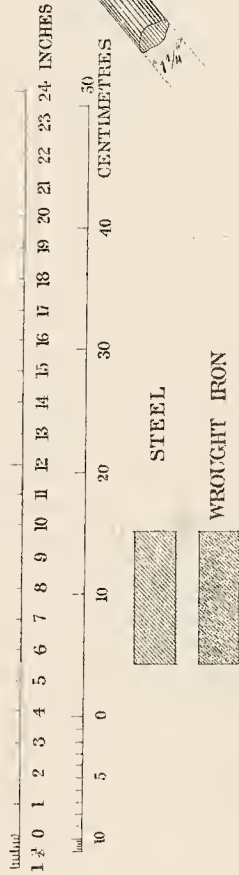






JOINT 22 OF RIB B OF  
CENTER SPAN

SCALES

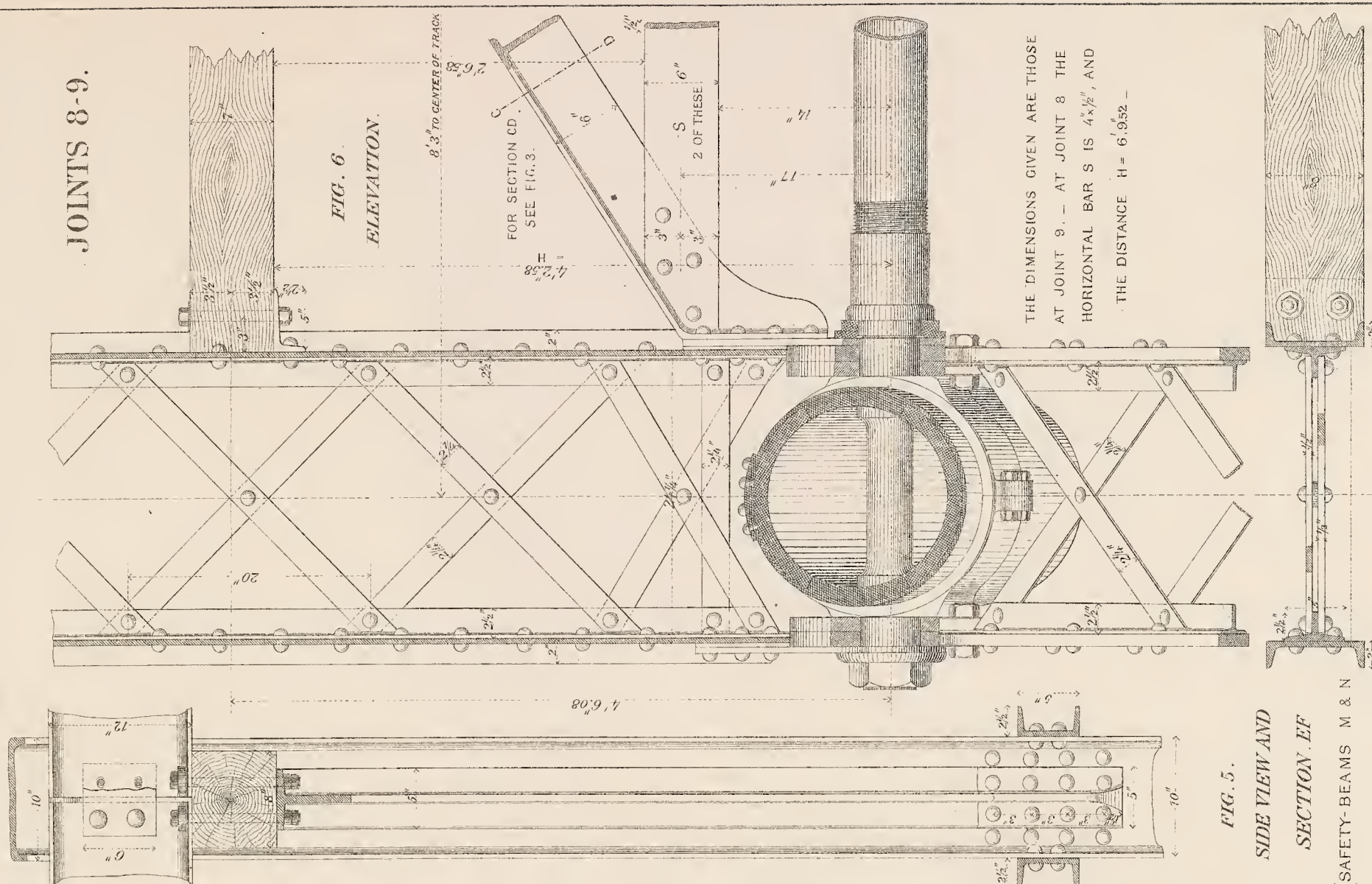








## JOINTS 8-9.



THE DIMENSIONS GIVEN ARE THOSE AT JOINT 9. — AT JOINT 8 THE HORIZONTAL BAR S IS  $4\frac{1}{2}''$ , AND THE DISTANCE H =  $6.932 -$

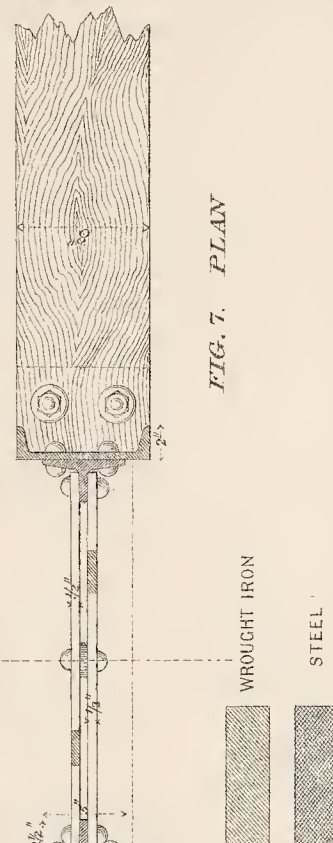
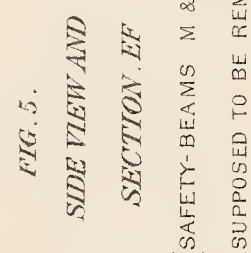
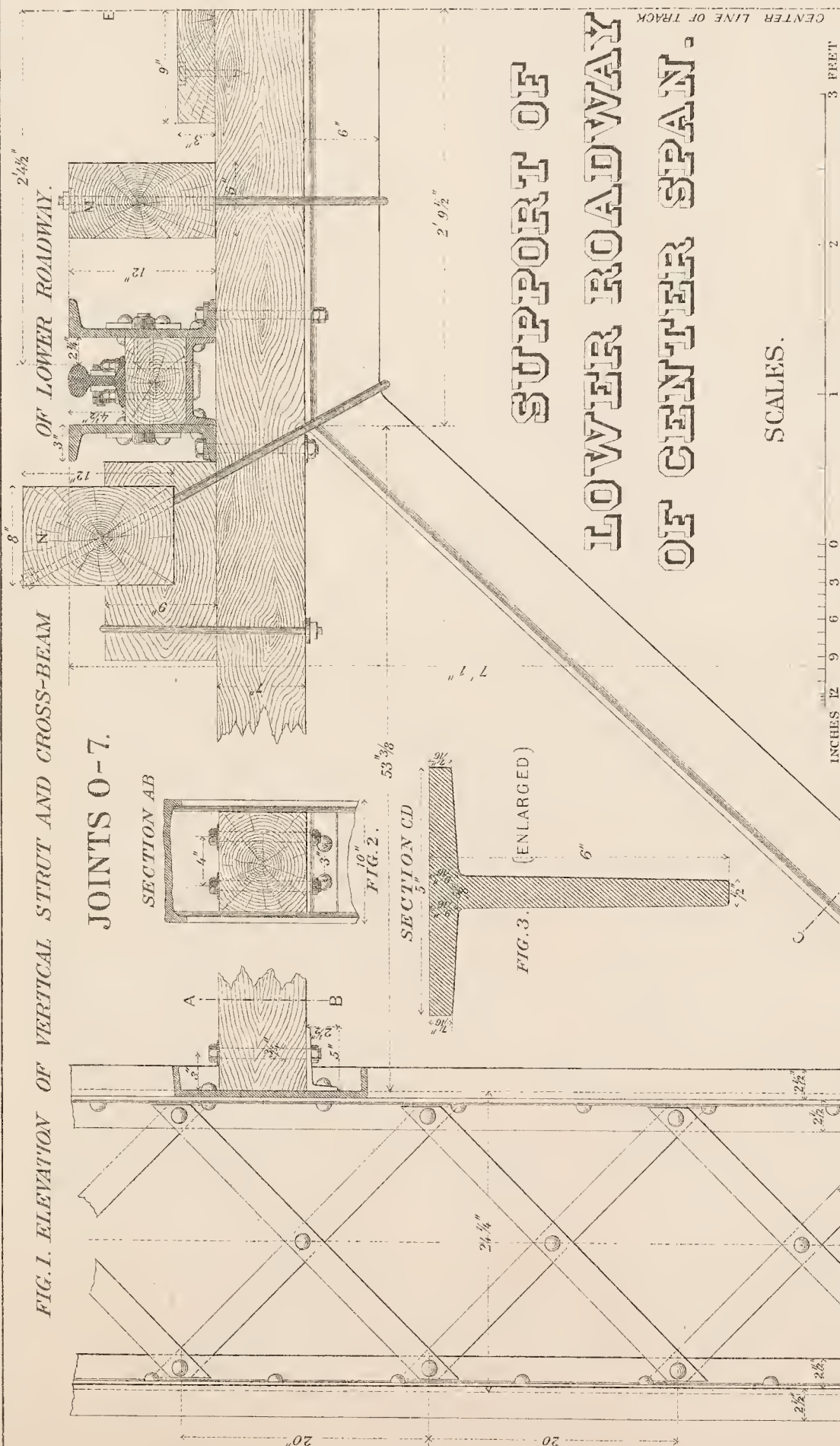


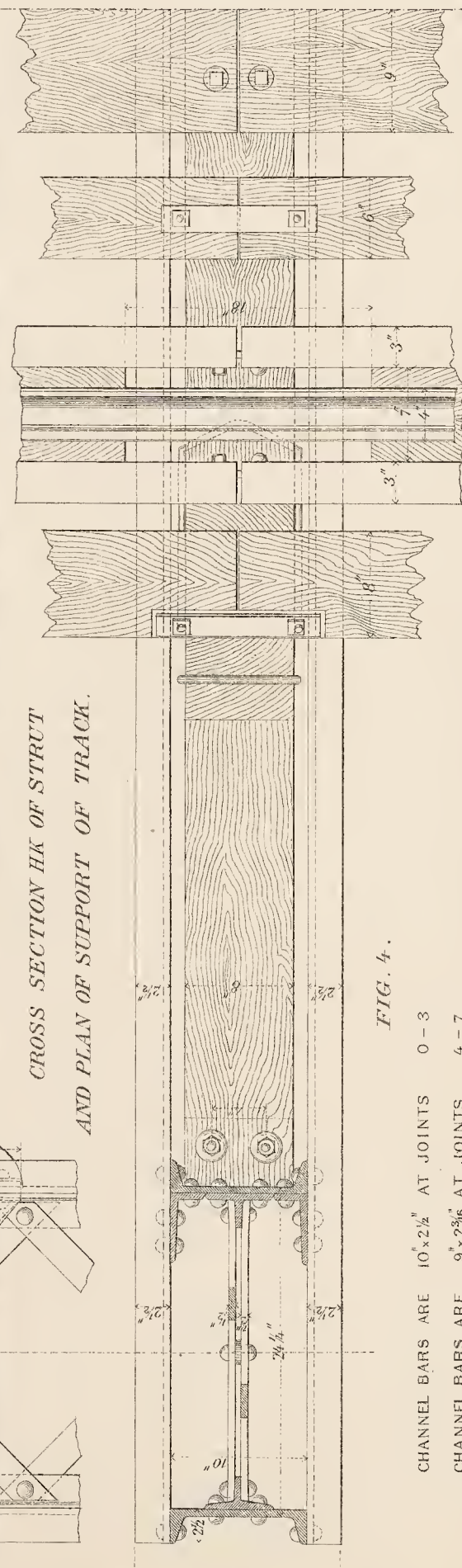
Diagram illustrating the cross-sections of Wrought Iron and Steel. Wrought Iron is shown with a rough, fibrous texture, while Steel is shown with a smooth, uniform texture.



**SUPPORT OF  
LOWER ROADWAY  
OF CENTER SPAN.**



FOR CONSTRUCTION OF LOWER ROADWAY - SEE ALSO PL. XXVIII.



CHANNEL BARS ARE  $10 \times 2\frac{1}{2}$ " AT JOINTS 0 - 3







SUPPORT OF LOWER ROADWAY OF CENTER SPAN.

FIG. 1. ELEVATION.

JOINT N<sup>o</sup> 10.

FIG. 2. SECTION A.B.

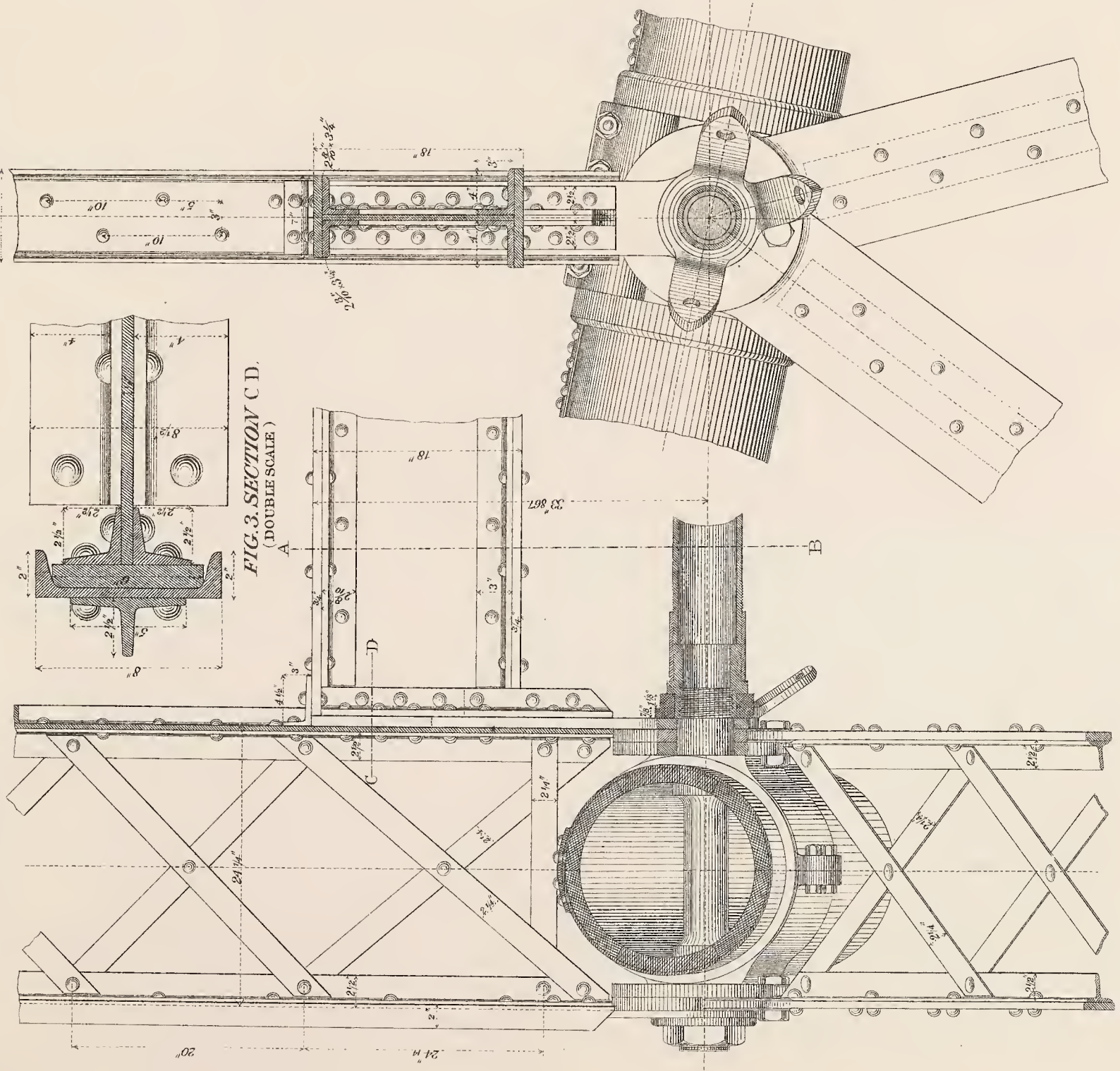
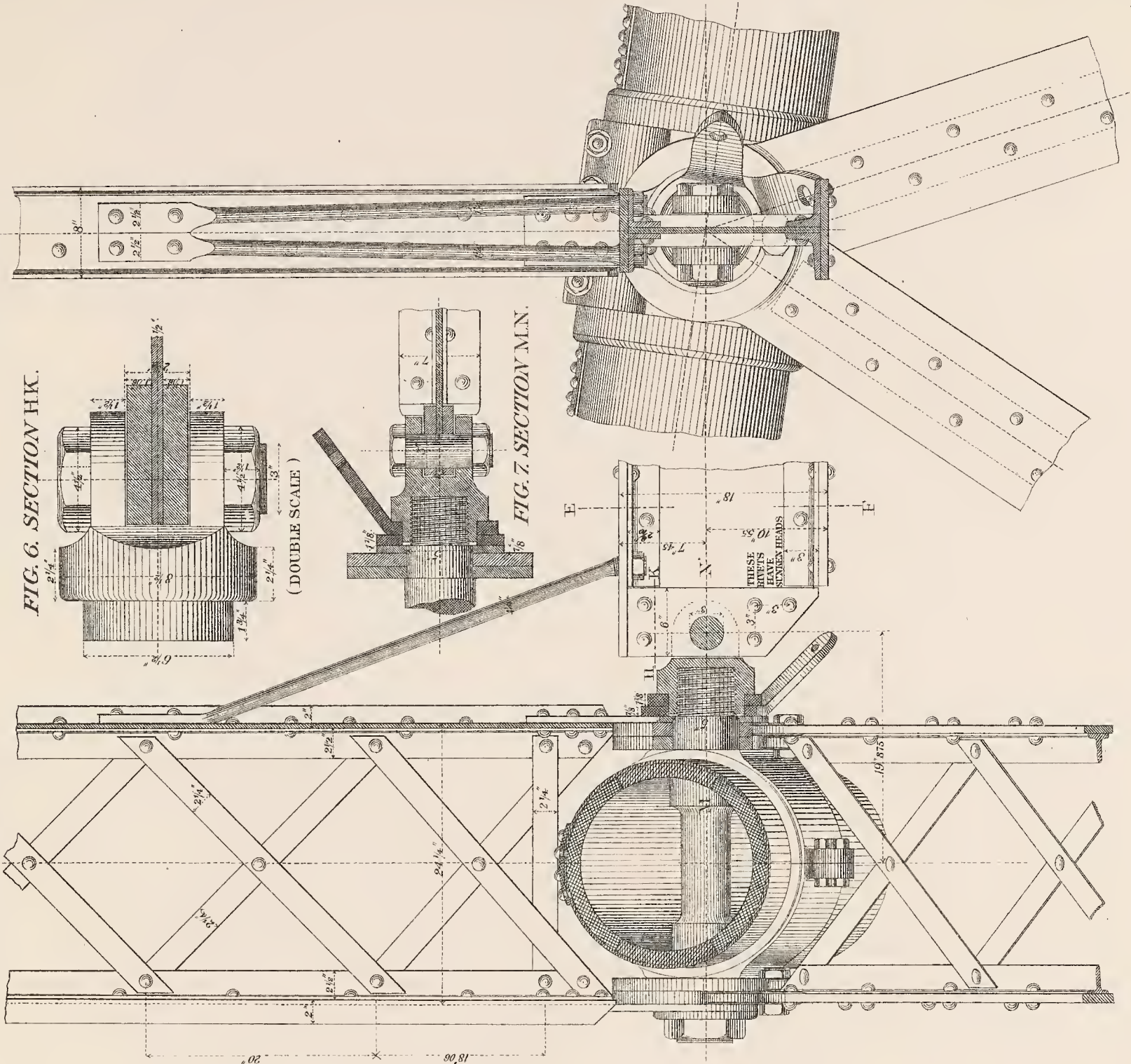


FIG. 4. ELEVATION.

JOINT N<sup>o</sup> 11.

FIG. 5. SECTION E.F.



INDICATES STEEL.  
" WROUGHT IRON

INCHES 12 9 6 3 0 1 2 3 FEET

CENTIMETRES 10 5 0 1 2 3 4 5 6 7 8 9 10 DECIMETRES



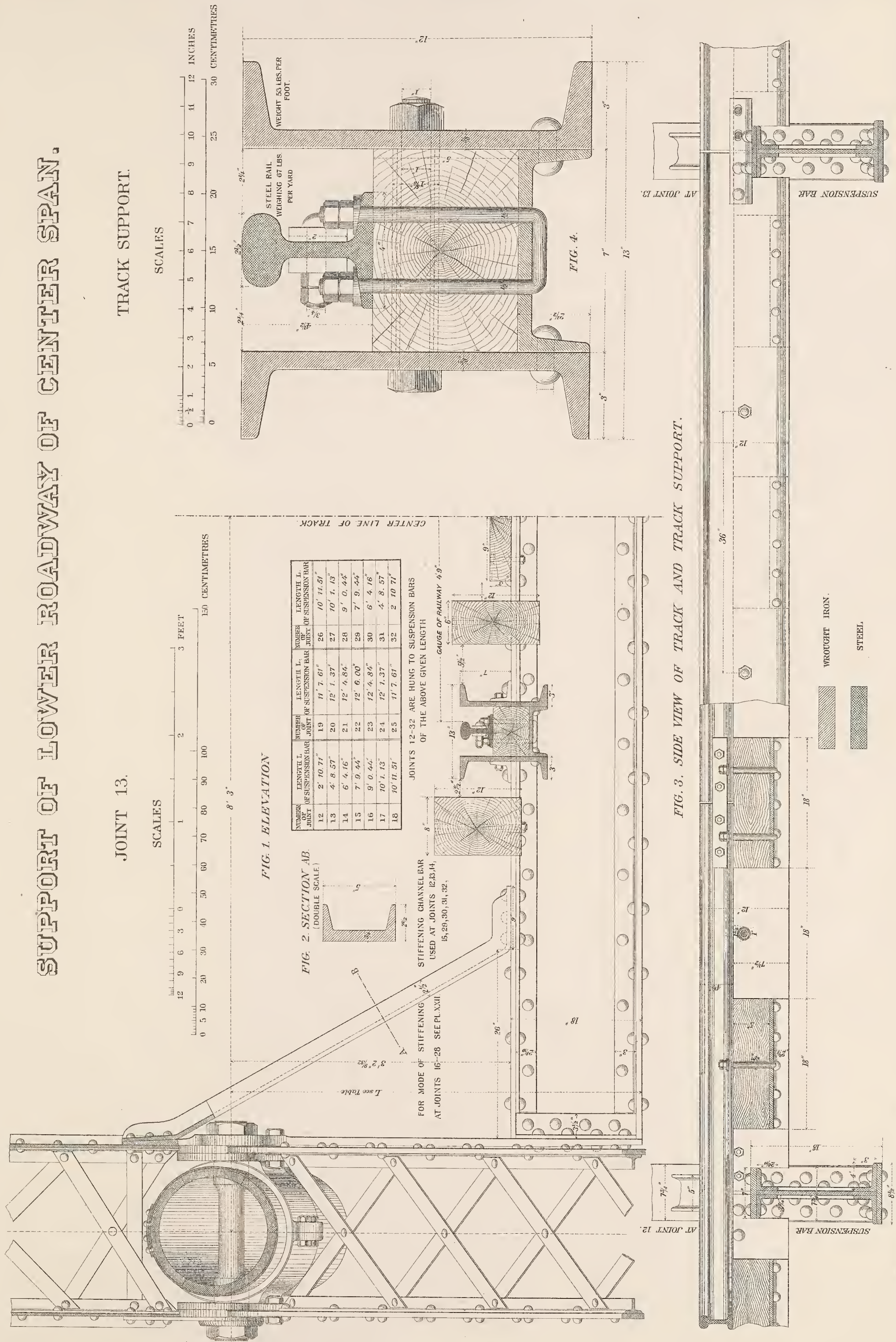




# SUPPORT OF LOWER ROADWAY OF CENTER SPAN.

JOINT 13.

## TRACK SUPPORT.



*Julius Bien, lith. N.Y.*

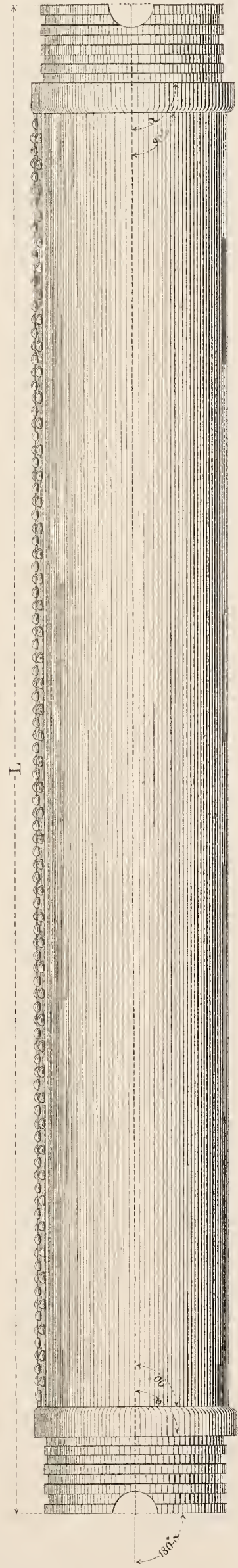
*W. P. Gerhard del., 1880.*







FIG. 1.  
ELEVATION OF TUBE.



$\alpha = 89^{\circ} 31' 46.27''$  FOR SIDE SPANS.

$\alpha = 89^{\circ} 32' 1.74''$  FOR CENTER SPAN.

FIG. 2.  
TOP VIEW OF TUBE.

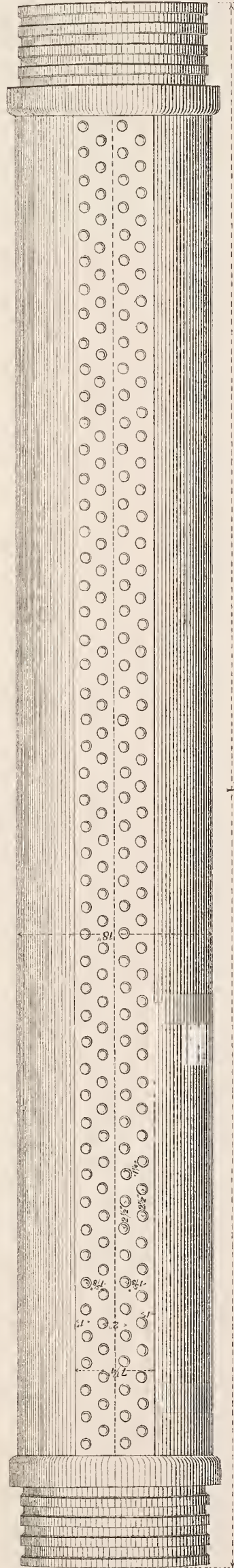


FIG. 3.

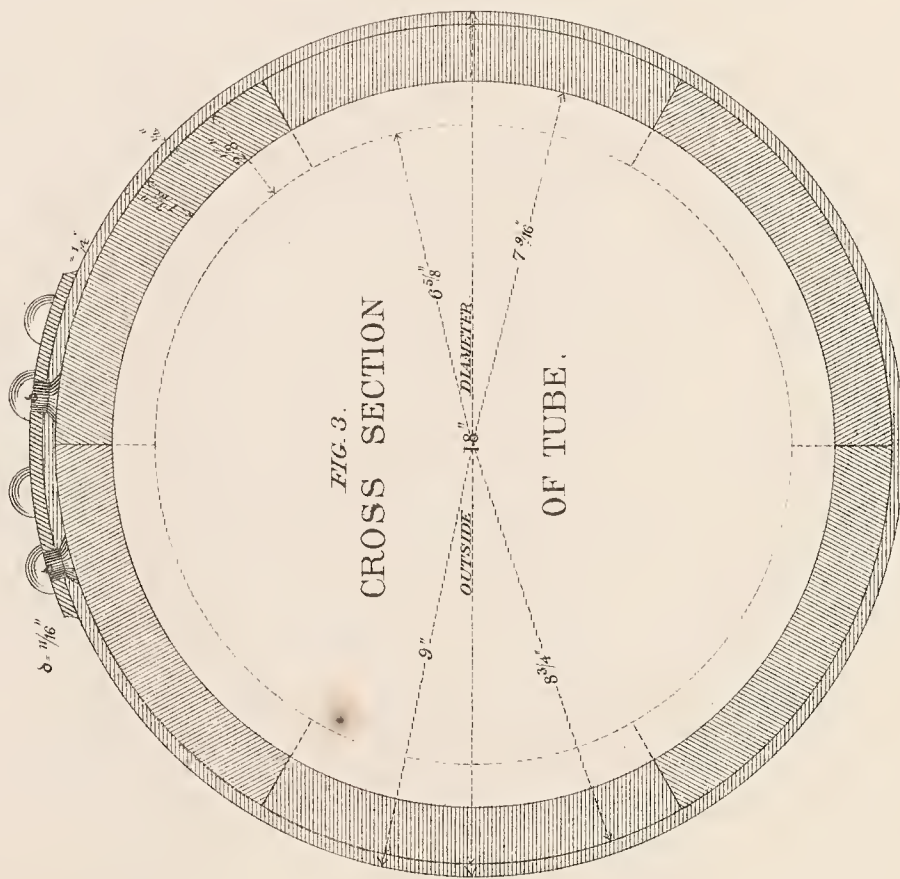
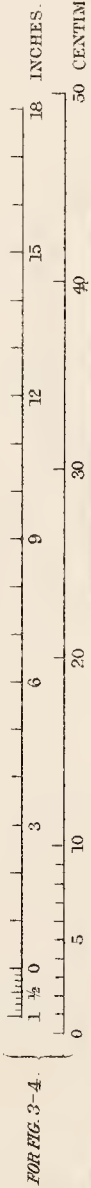


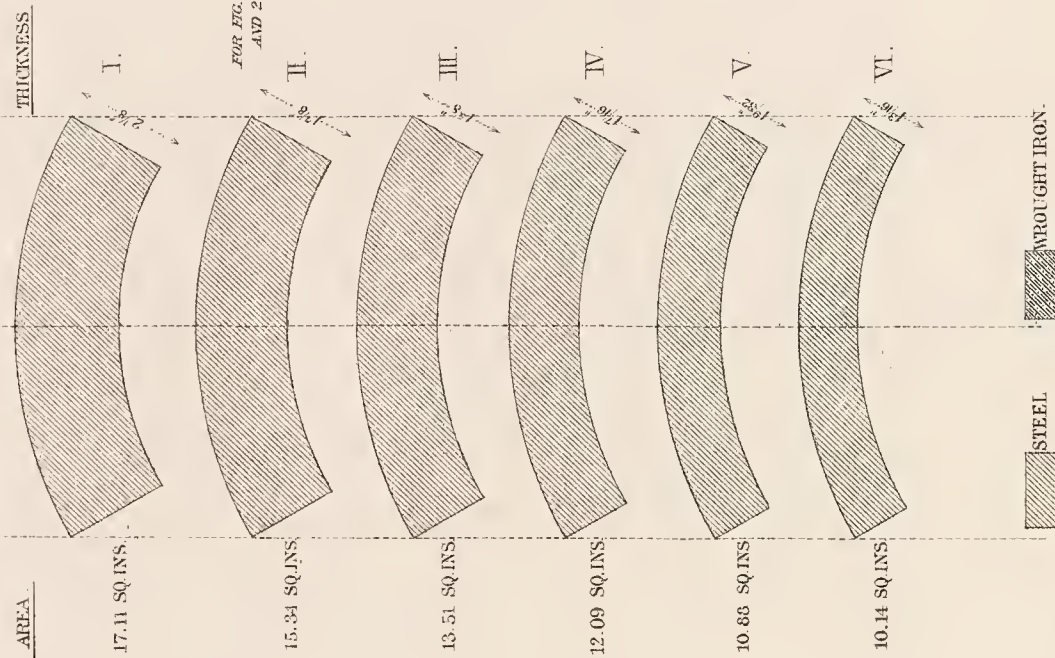
FIG. 3.  
CROSS SECTION  
OF TUBE.

SCALES.



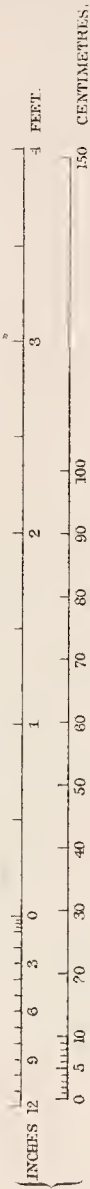
FOR FIG. 3-4.

FIG. 4.  
SECTIONS OF STAVES.



DETAILS OF TUBES.

SCALES.



LENGTH OF TUBES.

SIDE SPANS.		CENTER SPAN.	
UPPER MEMBER.	LOWER MEMBER.	UPPER MEMBER.	LOWER MEMBER.
L = 146.39 INS.	L = 144.02 INS.	L = 144.965 INS.	L = 142.622 INS.
LENGTH OF SKEWBACK TUBES.			
L = 158.387 INS.		L = 156.965 INS.	
L = 126.021 INS.		L = 126.883 INS.	
L = 125.084 INS.			

SECTIONS OF STAVES USED IN TUBES.

NUMBER OF STAVE.	SIDE SPANS.		CENTER SPAN.	
	UPPER MEMBER.	LOWER MEMBER.	UPPER MEMBER.	LOWER MEMBER.
I.	BETW. 0-1, 41-42.	BETW. 0-1, 42-43.	BETW. 0-1, 43-44.	BETW. 0-1, 44-45.
II.	BETW. 1-2, 40-41.	BETW. 1-2, 41-42.	BETW. 1-2, 42-43.	BETW. 1-2, 43-44.
III.	BETW. 2-3, 39-40.	BETW. 2-3, 40-41.	BETW. 2-3, 41-42.	BETW. 2-3, 42-43.
IV.	BETW. 3-5, 37-39.	BETW. 3-5, 38-40.	BETW. 3-5, 39-41.	BETW. 3-5, 40-42.
V.	BETW. 5-37.	BETW. 5-38.	NOT USED.	NOT USED.
VI.	NOT USED.	NOT USED.	BETW. 5-39.	BETW. 5-40.











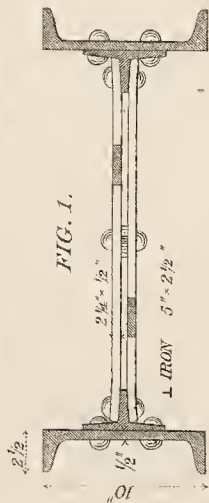




VERTICAL STRUTS.

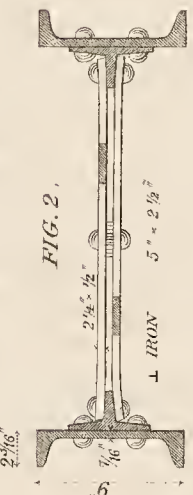
STRUTS WITH 10" CHANNEL BARS.

AT JOINTS 0, 1, 2, 40, 41, 42 OF SIDE SPANS.



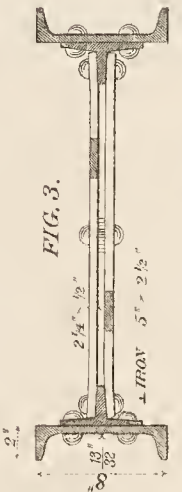
STRUTS WITH 9" CHANNEL BARS.

AT JOINTS 3, 4, 5, 36, 37, 38, 39 OF SIDE SPANS.



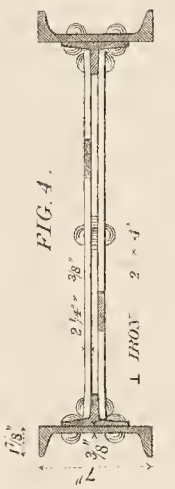
STRUTS WITH 8" CHANNEL BARS.

AT JOINTS 6, 7, 8, 32, 33, 34, 35 OF SIDE SPANS.



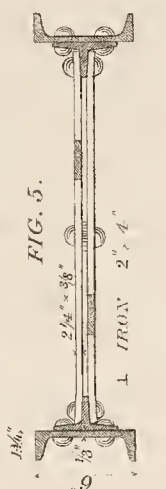
STRUTS WITH 7" CHANNEL BARS.

AT JOINTS 9, 10, 11, 12, 28, 29, 30, 31 OF SIDE SPANS.



STRUTS WITH 6" CHANNEL BARS.

AT JOINTS 13-27 OF SIDE SPANS.



AT JOINTS 0, 1, 2, 3, 41, 42, 43, 44 OF CENTER SPAN

AT JOINTS 4, 5, 6, 7, 37, 38, 39, 40 OF CENTER SPAN.

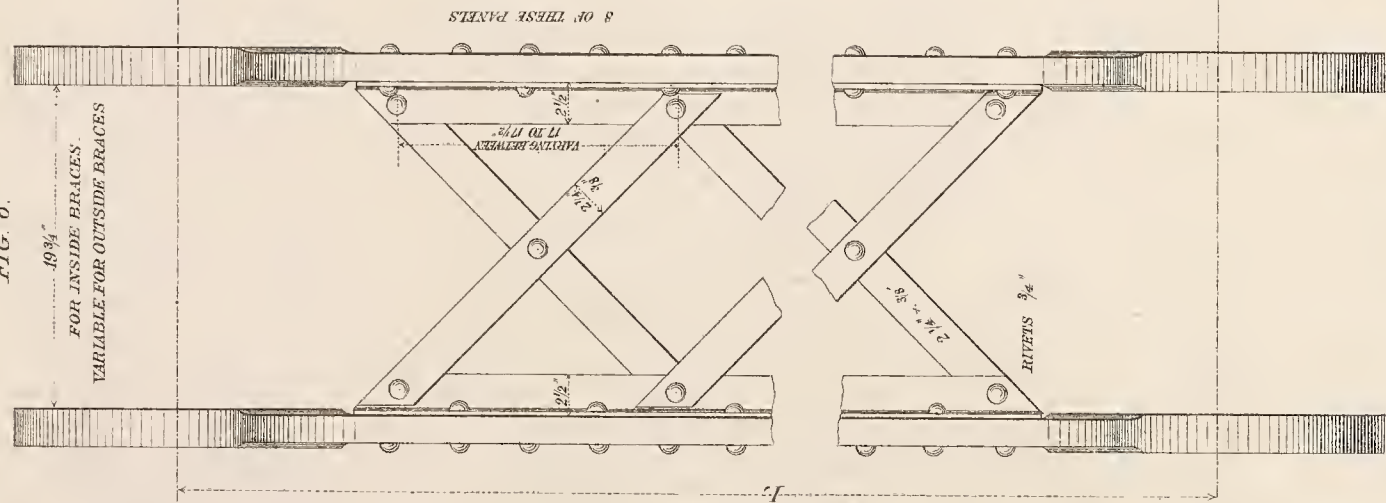
AT JOINTS 8, 9, 10, 11, 33, 34, 35, 36 OF CENTER SPAN.

AT JOINTS 12, 13, 14, 15, 29, 30, 31, 32 OF CENTER SPAN

AT JOINTS 16, 28 OF CENTER SPAN

MAIN BRACE BARS.

FIG. 6.



END VIEW

FIG. 12.



HORIZONTAL STAYS BETWEEN RIBS.

FIG. 11.



SECTION AB.

FIG. 13.

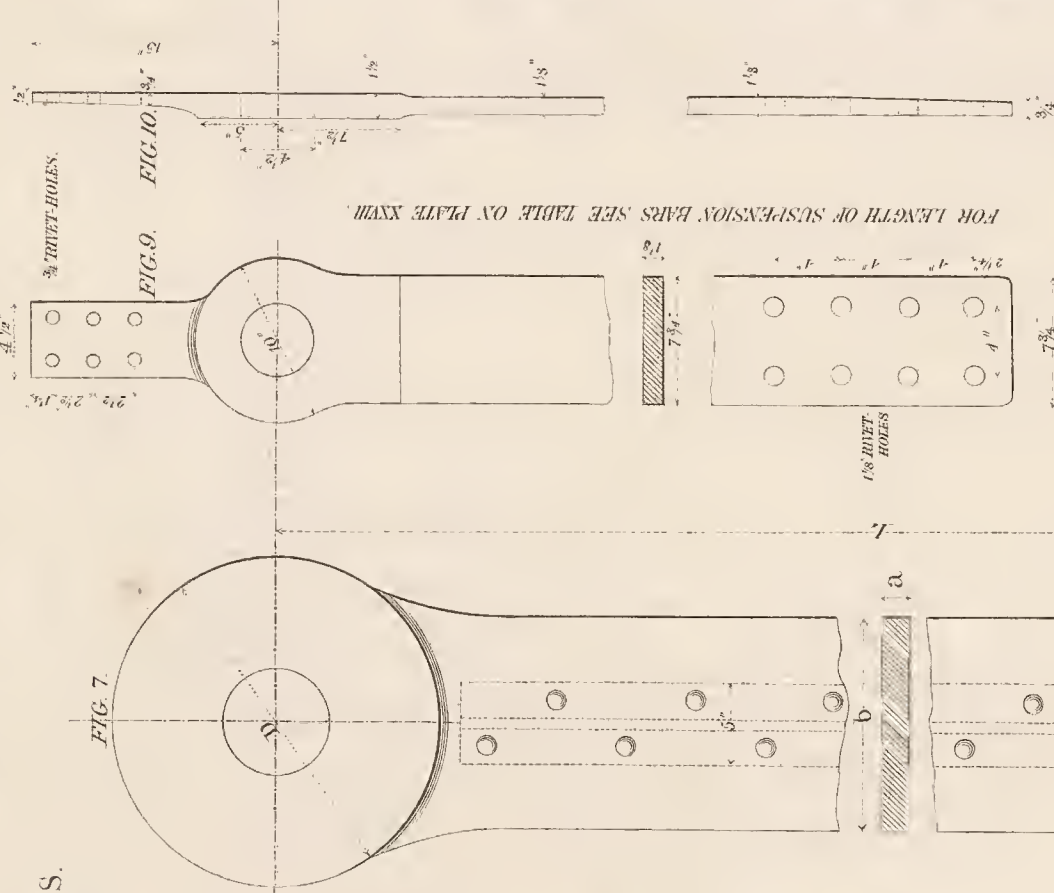


TABLE OF DIMENSIONS OF BRACE BARS.

SIDE SPANS.		a	b	CENTER SPAN.		a	b
BETW. JOINTS	0-1, 1-1, 2-2, 2, 42-42, 42-41, 41-41, 41-40	1 1/8"	1 3/8"	BETW. JOINTS	0-1, 1-1, 2-2, 44-44, 44-43, 43-43, 43-42	1 1/8"	1 3/8"
"	2-3, 3-3, 3-4, 4-4, 4-5, 40-40, 40-39, 39-39, 39-38, 38-38	1 1/2"	1 2"	"	2-3, 3-3, 3-4, 4-4, 4-5, 42-42, 42-41, 41-41, 41-40, 40-40	1 1/2"	1 2"
"	5-5, 5-6, 6-6, 6-7, 38-37, 37-37, 37-36, 36-36	1 1/4"	1 1"	"	5-5, 5-6, 6-6, 6-7, 40-39, 39-39, 39-38, 38-38	1 1/4"	1 1"
"	7-7, 7-8, 8-8, 8-9, 36-35, 35-35, 35-34, 34-34	1"	1 1/4"	"	7-7, 7-8, 8-8, 8-9, 38-37, 37-37, 37-36	1"	1 1/4"
"	9-9, 9-10, 10-10, 10-11, 34-33, 33-33, 33-32, 32-32	3/4"	1 1/8"	"	9-9, 9-10, 10-10, 10-11, 36-35, 35-35, 35-34, 34-34	3/4"	1 1/8"
BETW. ALL OTHER JOINTS FROM 11-32		3/4"	10"	"	9-10, 10-10, 10-11, 11-11, 35-35, 35-34, 34-34, 34-33	3/4"	11"
				BETW. ALL OTHER JOINTS FROM 11-33		1 1/8"	10"

SUSPENSION BARS.

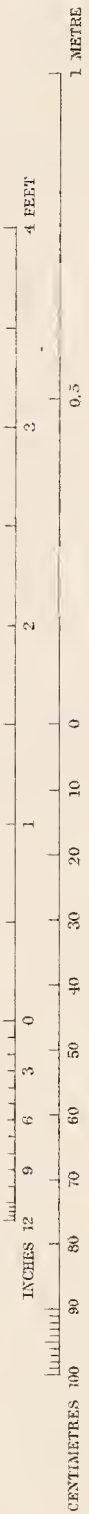
USED AT JOINTS 12-32 OF CENTER SPAN,  
" " " 11-30 " SIDE SPANS



LENGTH L OF BRACE BARS.

FOR SIDE SPANS - 10' 5" 286  
FOR CENTER SPAN - 13' 4" 993

SCALES.



DETAILS OF VERTICAL STRUTS, BRACES, SUSPENSION-BARS AND STAYS.







UPPER WIND-TRUSS.

FIG. 1.  
PLAN OF ONE-HALF CENTER SPAN.

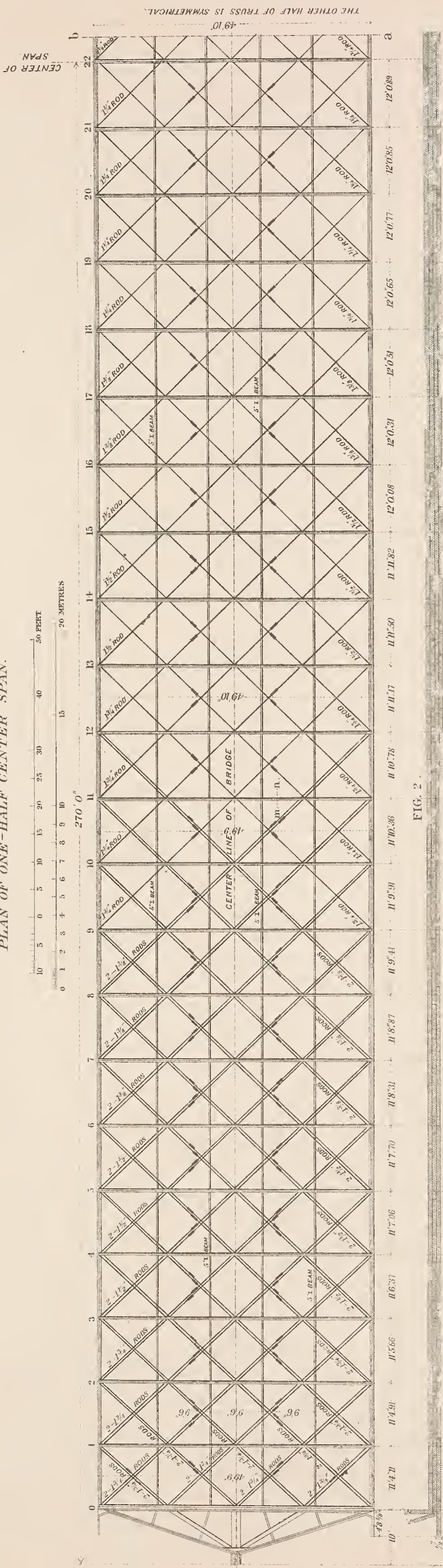


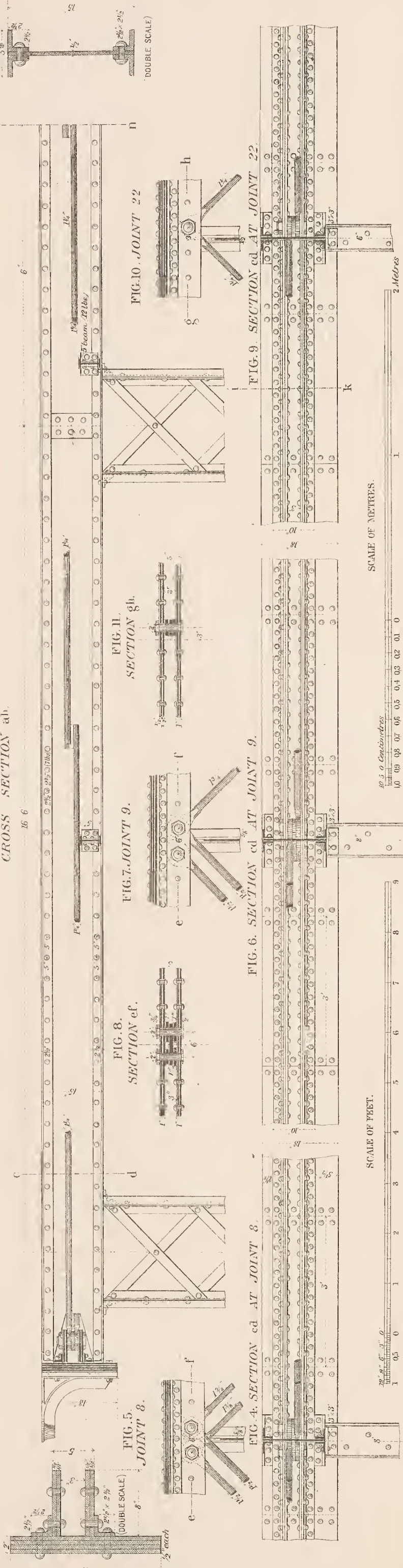
FIG. 2.

HORIZONTAL SECTION OF VERTICAL PLATES IN CHORD OF TRUSS.

FIG. 13.  
SECTION ik.

FIG. 3.  
CROSS SECTION ab.

FIG. 12.  
SECTION mn.



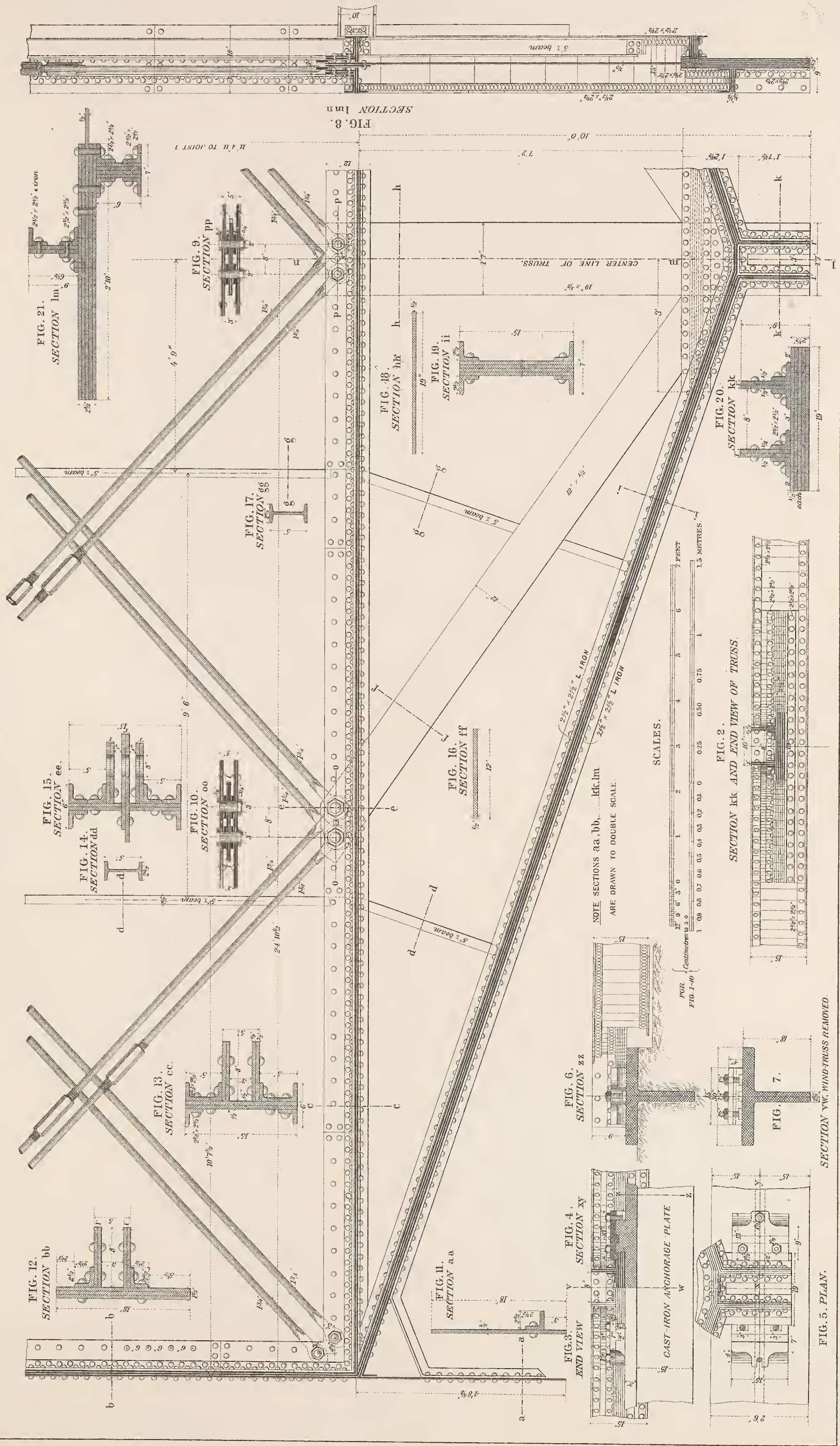






# UPPER WIND-TRUSS.

FIG. 1.  
HORIZONTAL SECTION OF END OF TRUSS.



W.P. Gerhard del., 1880.

J. B. B. lith. N.Y.







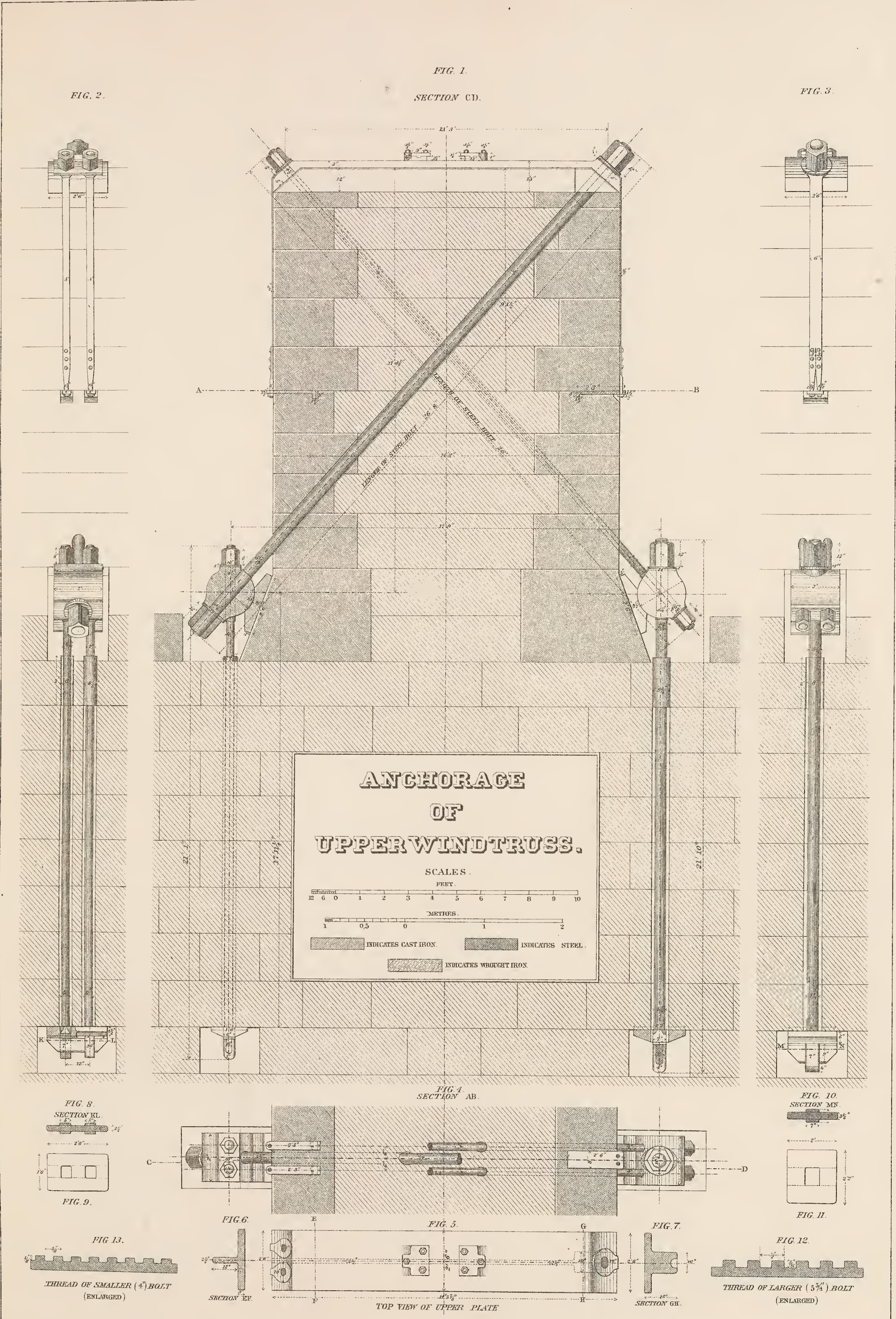








FIG. 1. ELEVATION OF TESTING MACHINE.

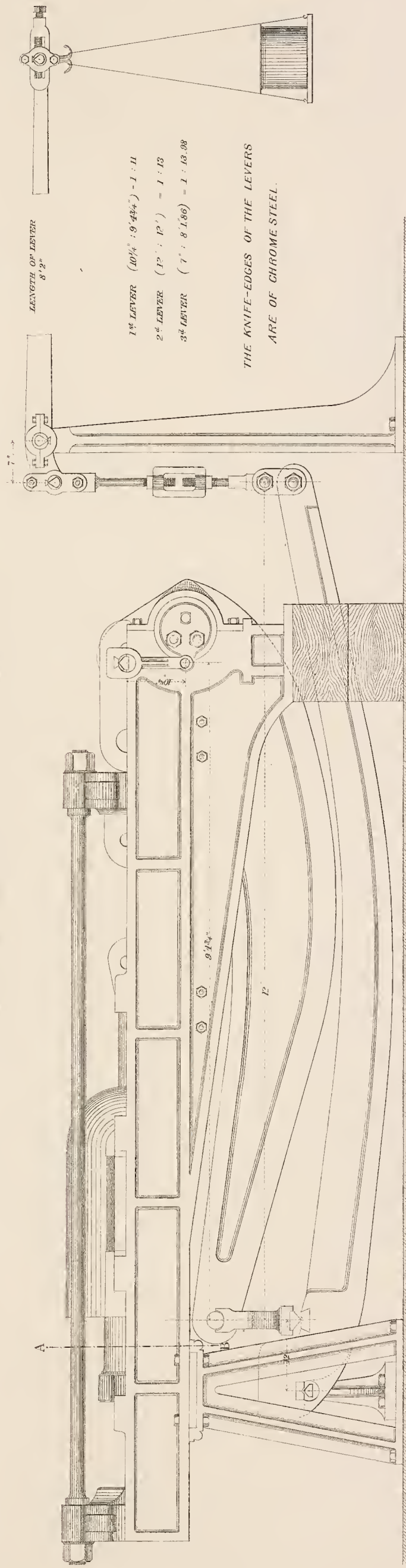


FIG. 2. LONGITUDINAL SECTION CD.

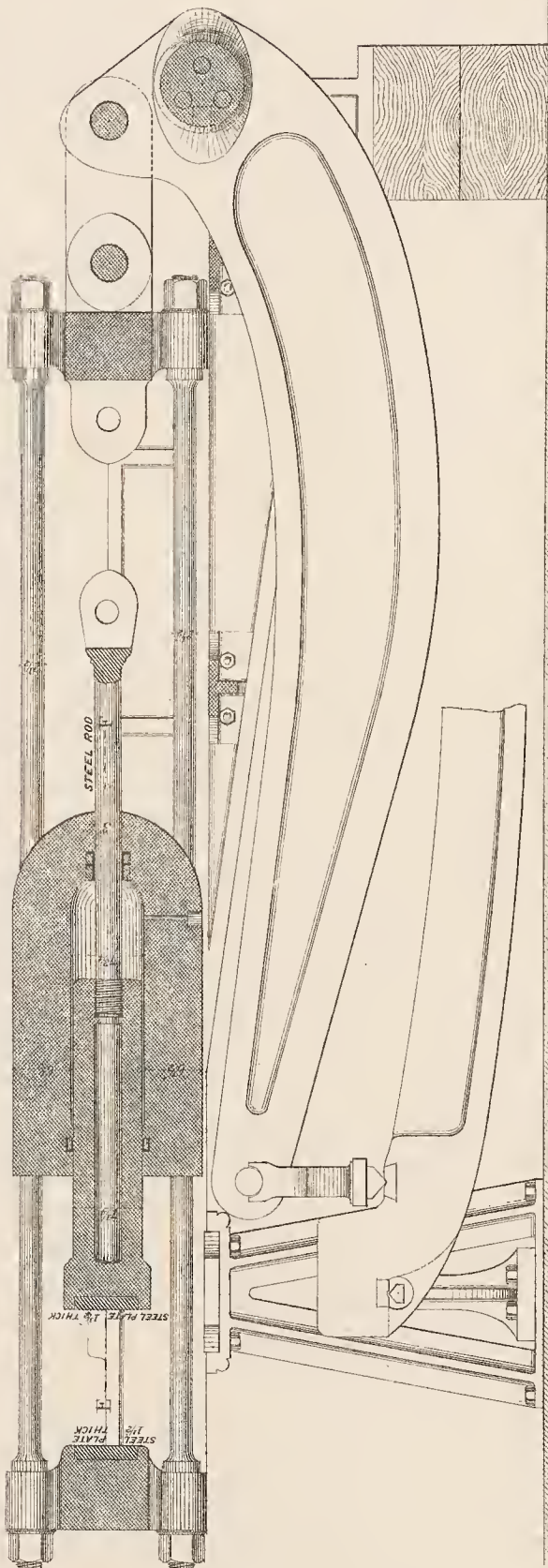
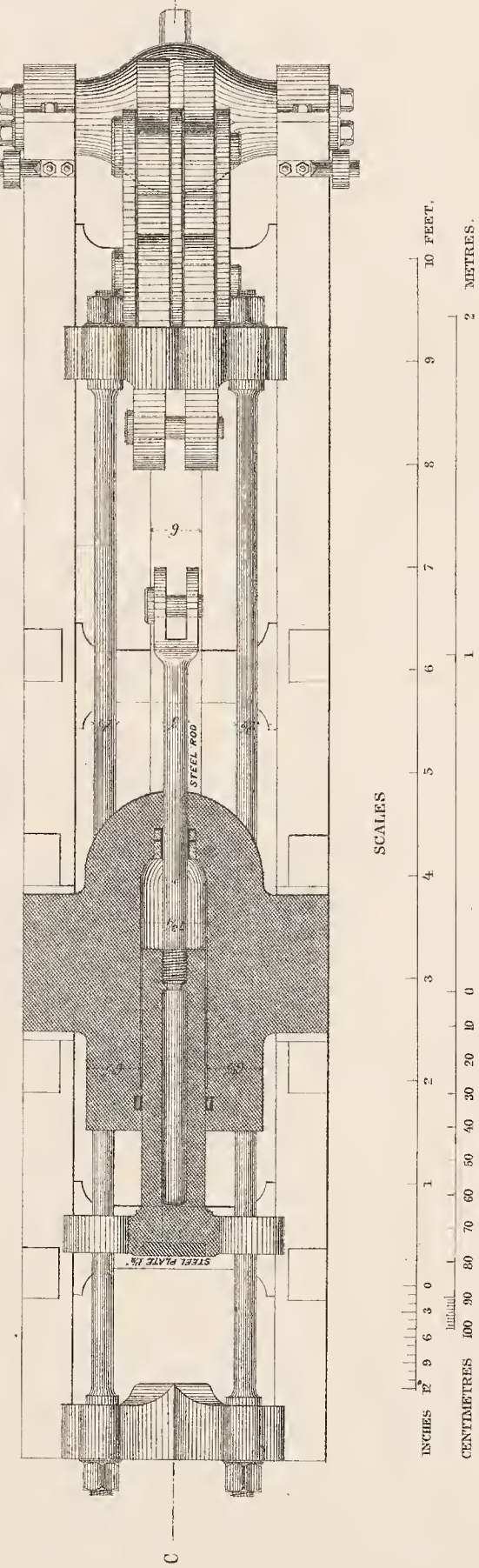


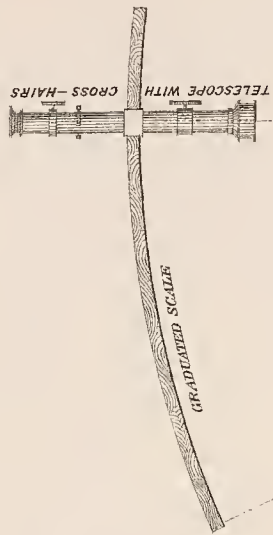
FIG. 3. HORIZONTAL SECTION EF.



# ST. LOUIS TESTING MACHINE.

CAPACITY-100 TONS

COMBINED LEVERAGE-1999.2, i.e. WEIGHT OF 1 LB. APPLIED TO SCALE PAN EXERTED A FORCE OF 1999.2, OR 2000 LBS.-1 TON ON LEVERS



MOTEMENT OF COLLARS WAS ENLARGED 2400 TIMES, 20000 PART OF ONE INCH COULD BE READ ON THE GRADUATED SCALE.

FIG. 4. CROSS SECTION AB

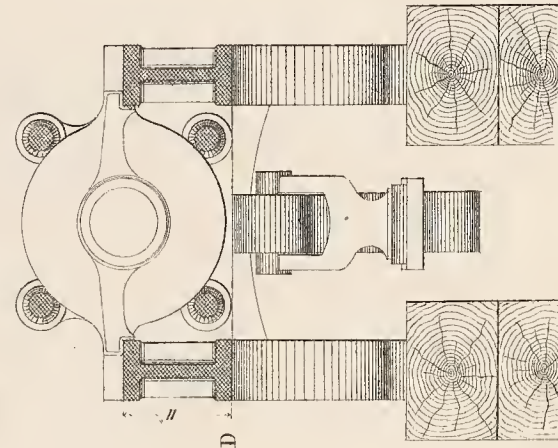
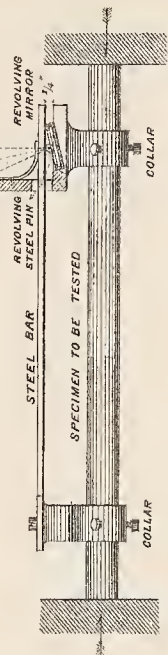


FIG. 5.

DIAGRAM

SHOWING MODE OF MEASURING CHANGES IN LENGTH OF SPECIMENS.









PHILADELPHIA  
TESTING MACHINE.

FIG. 3.

END VIEW OF

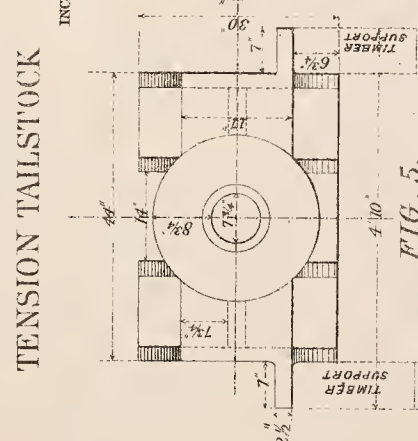


FIG. 5.

SECTION ab OF  
STAVE BED PLATE.

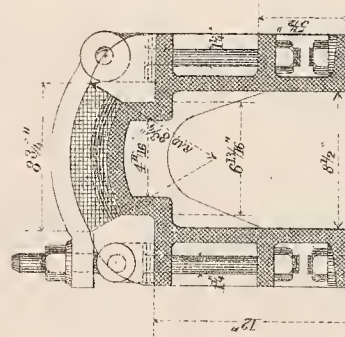


FIG. 1.

# ELEVATION OF TESTING MACHINE.

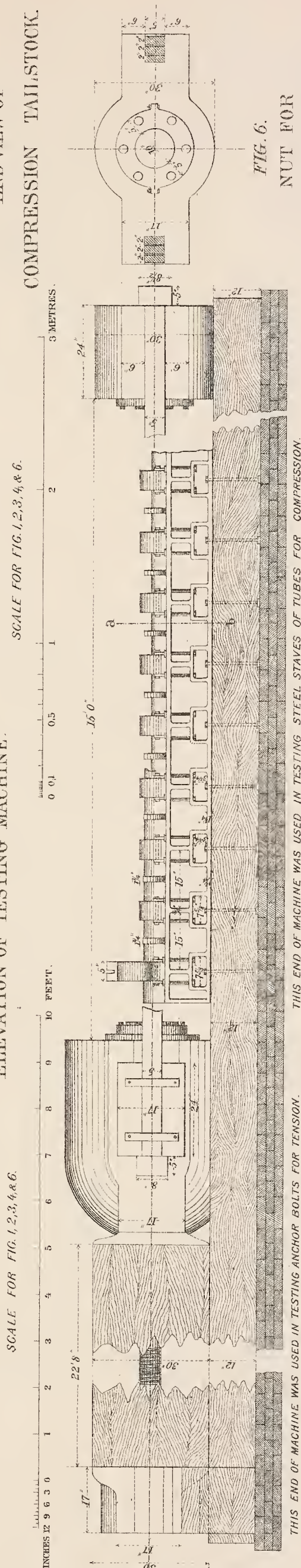


FIG. 6.

NUT FOR  
PULLING BOLT.

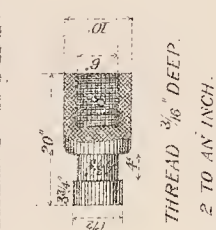


FIG. 2.

# PLAN OF TESTING MACHINE.

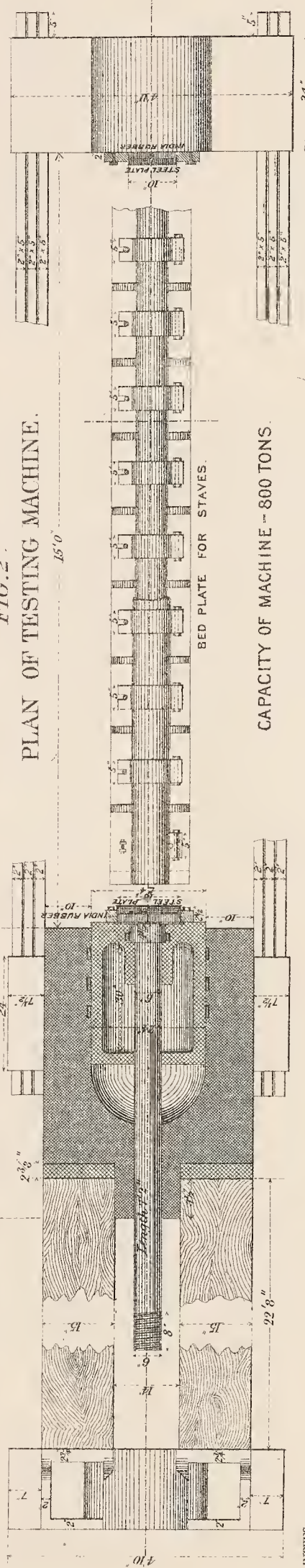
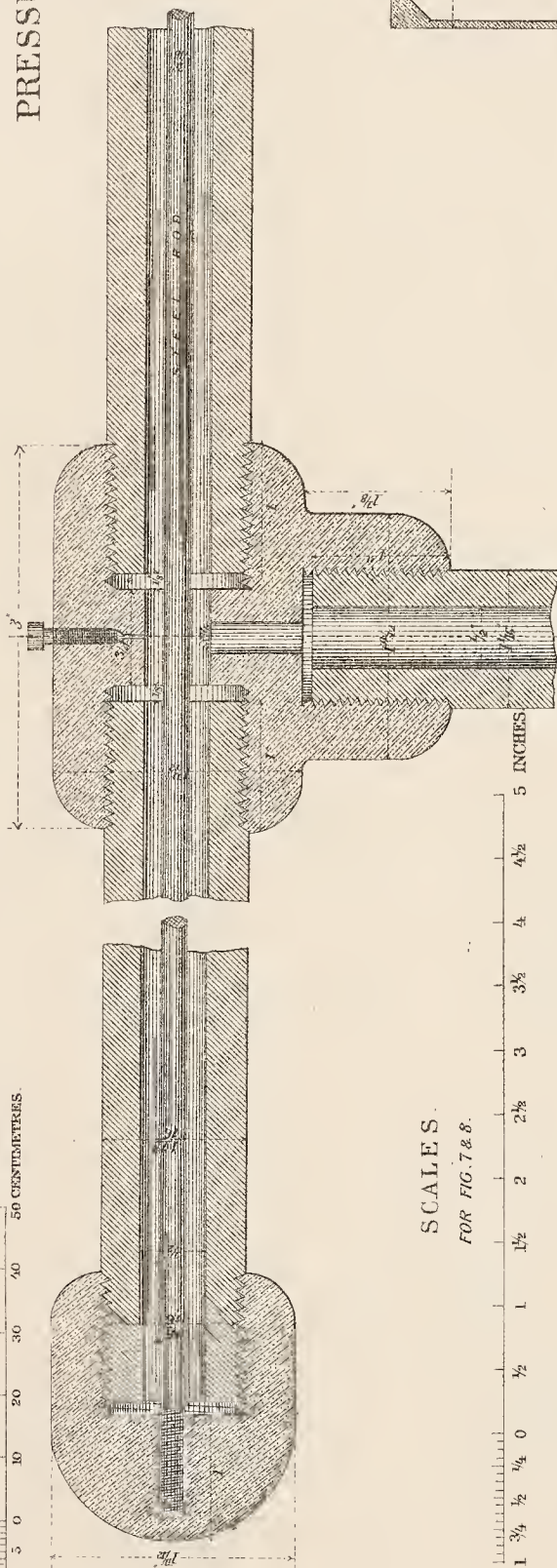


FIG. 8.

# PRESSURE GAUGE.



SCALES.  
FOR FIG. 7 & 8.

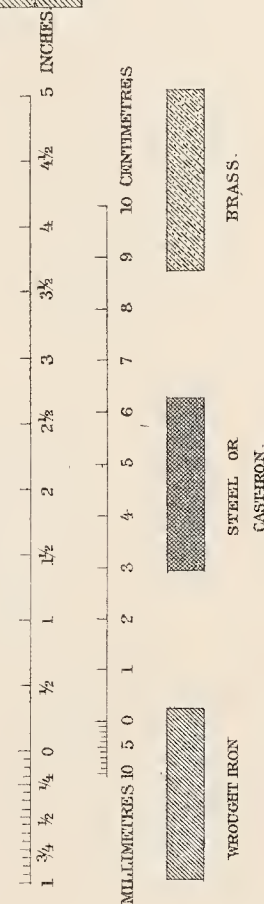
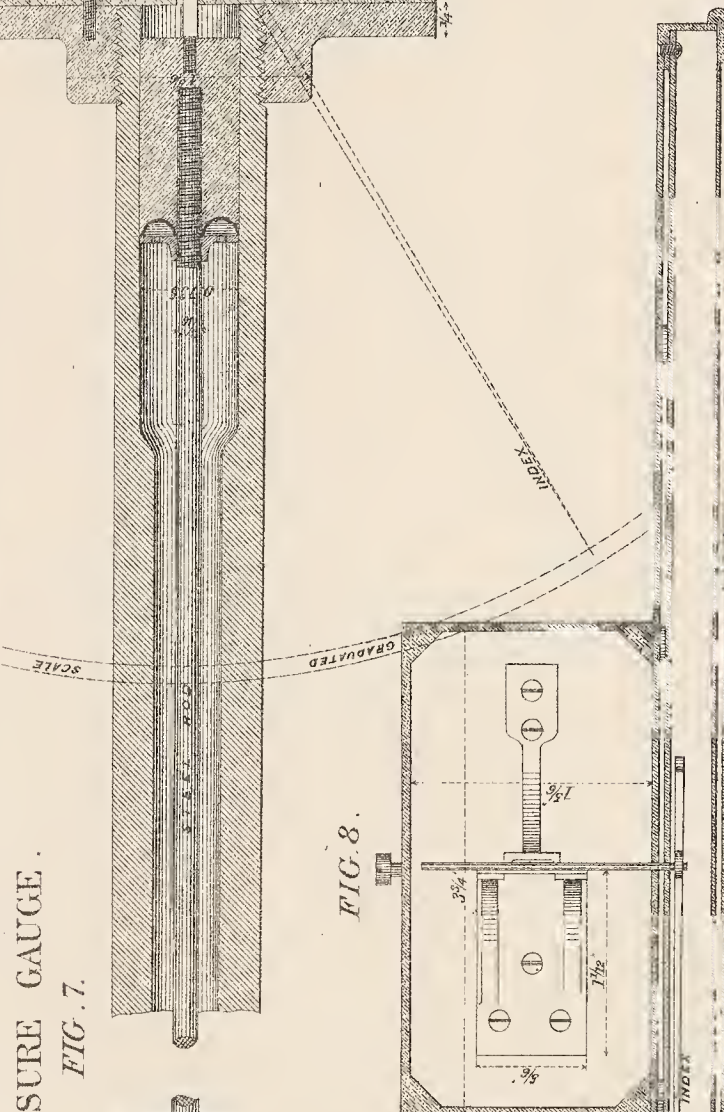


FIG. 8.

URE GAUGE.









# METHOD OF ERECTION.

SCALES

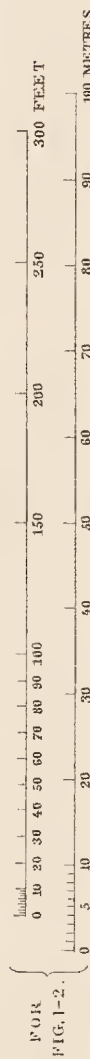


FIG. 1.

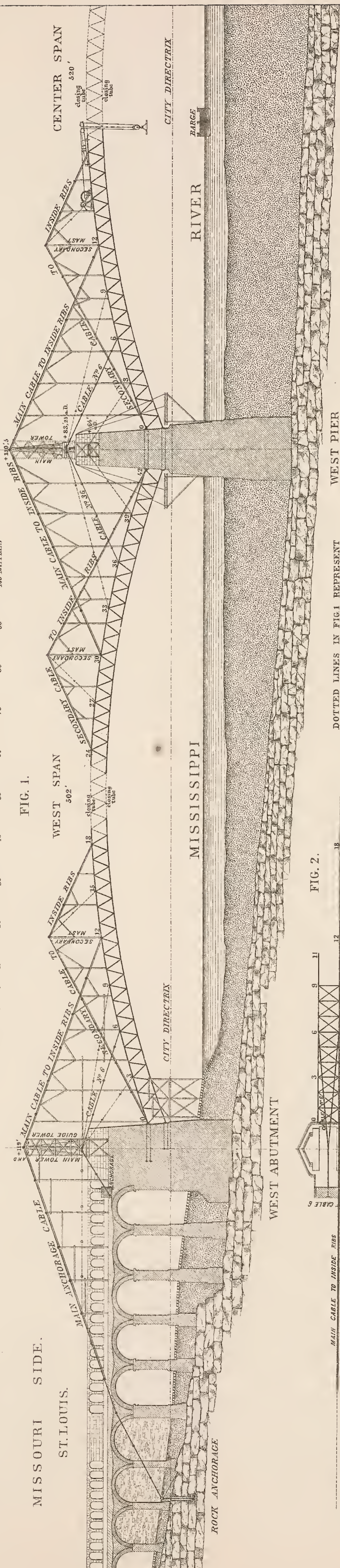


FIG. 2.

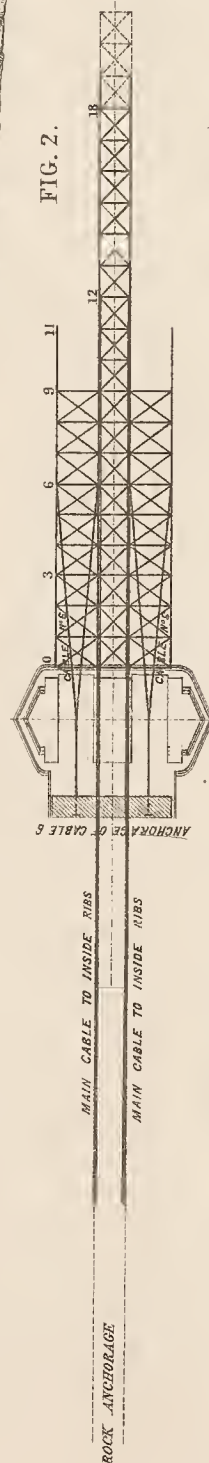


FIG. 3.

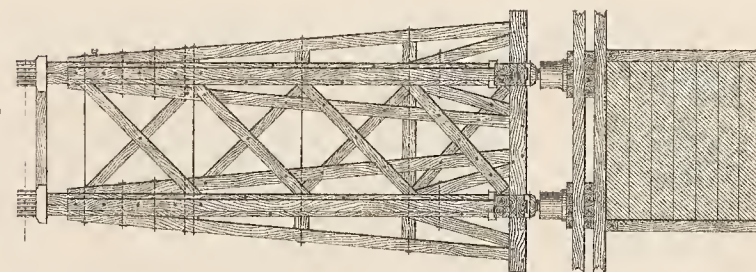


FIG. 4.

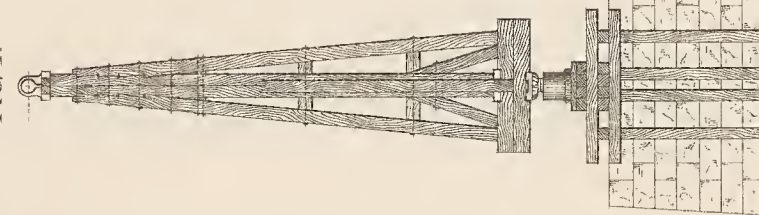


FIG. 5.

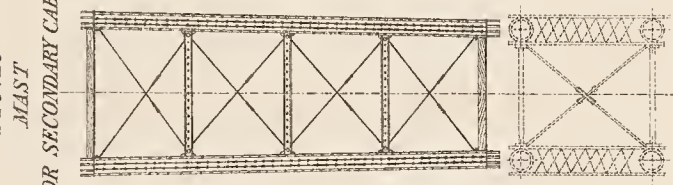


FIG. 6.

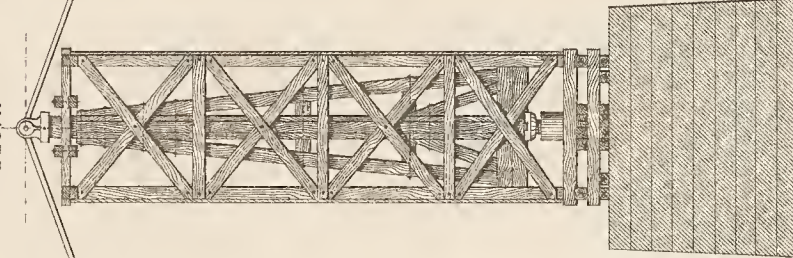


FIG. 7.

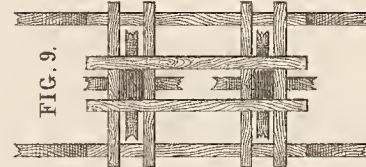


FIG. 8.

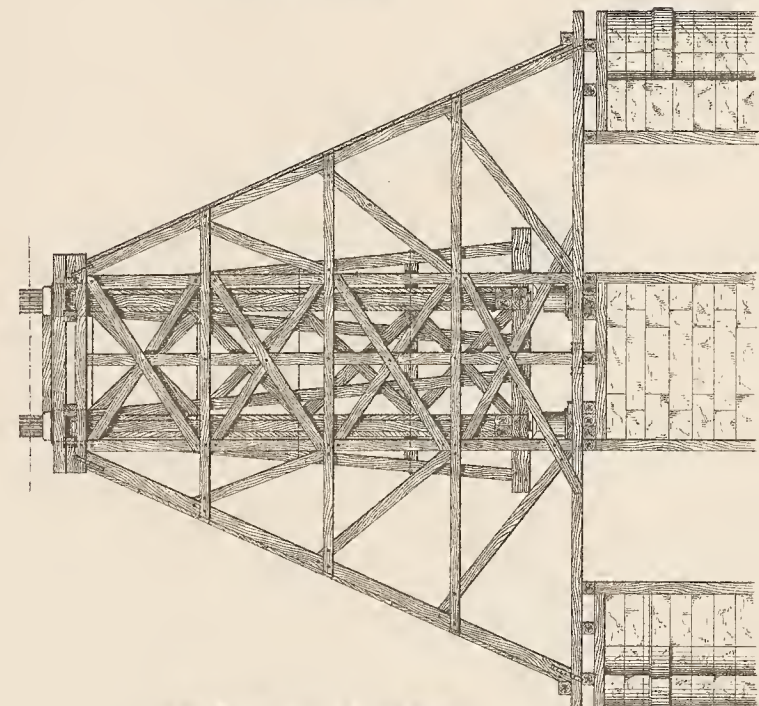


FIG. 9.

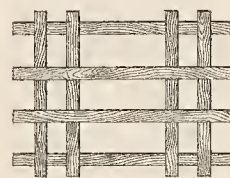
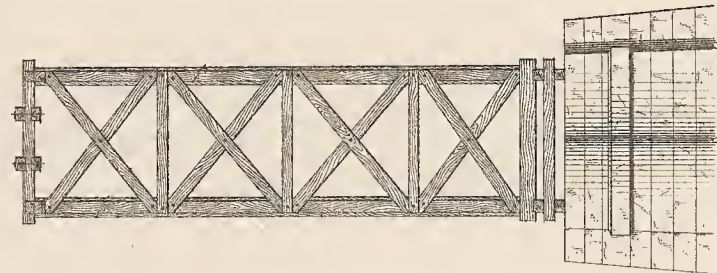


FIG. 10.



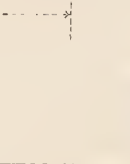
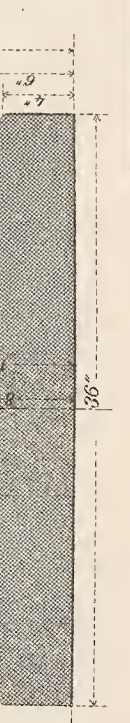
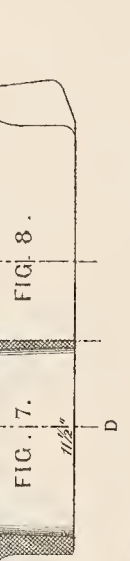
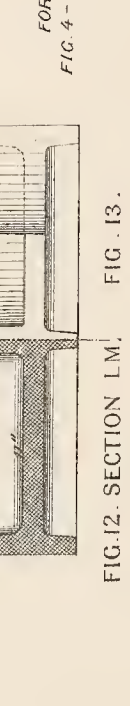
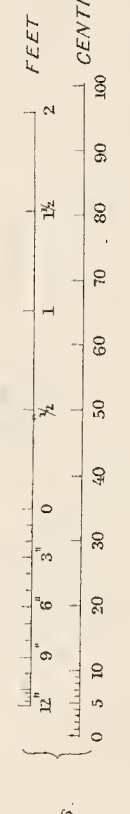
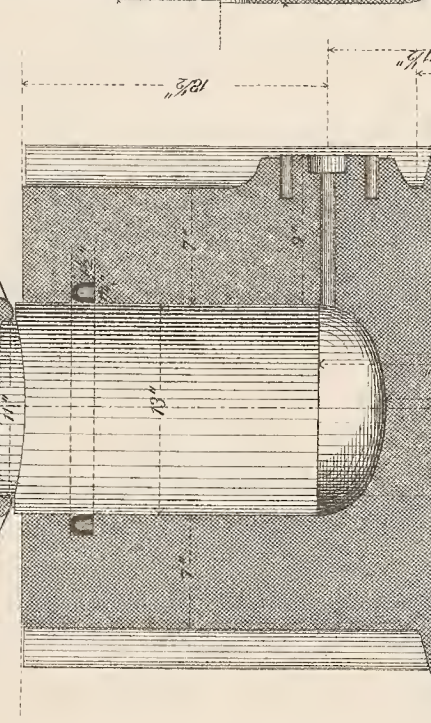
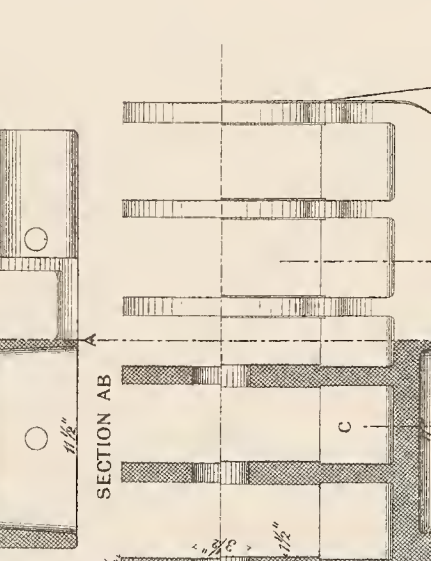
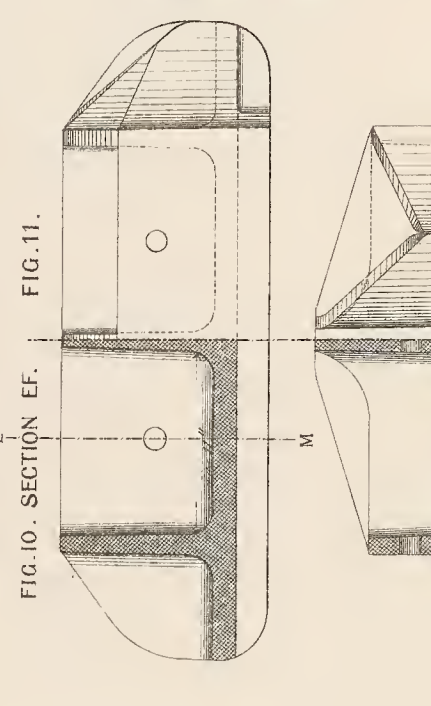
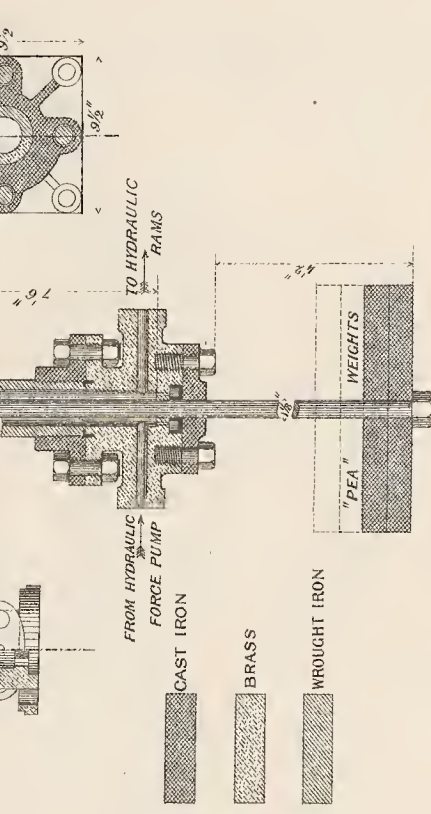
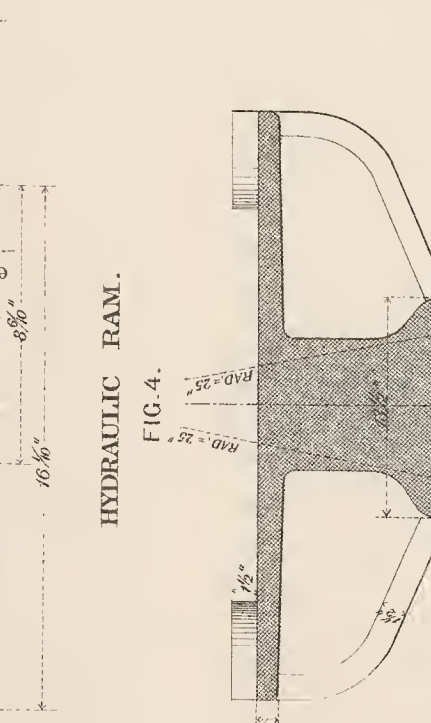
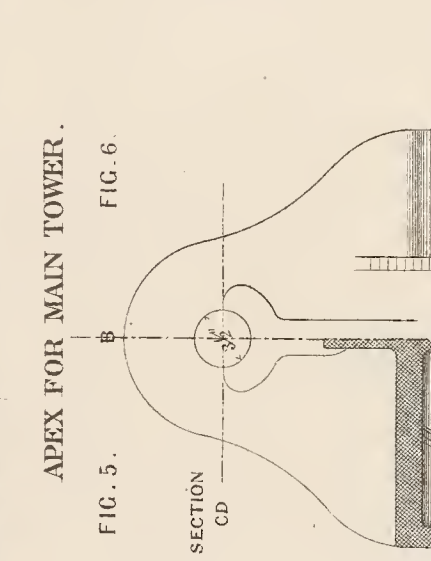
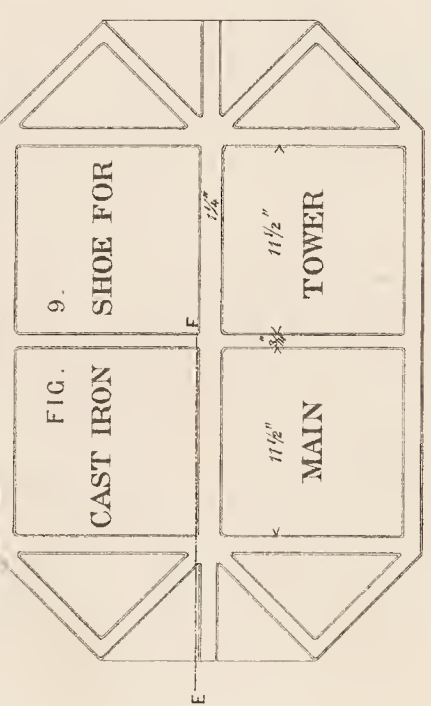
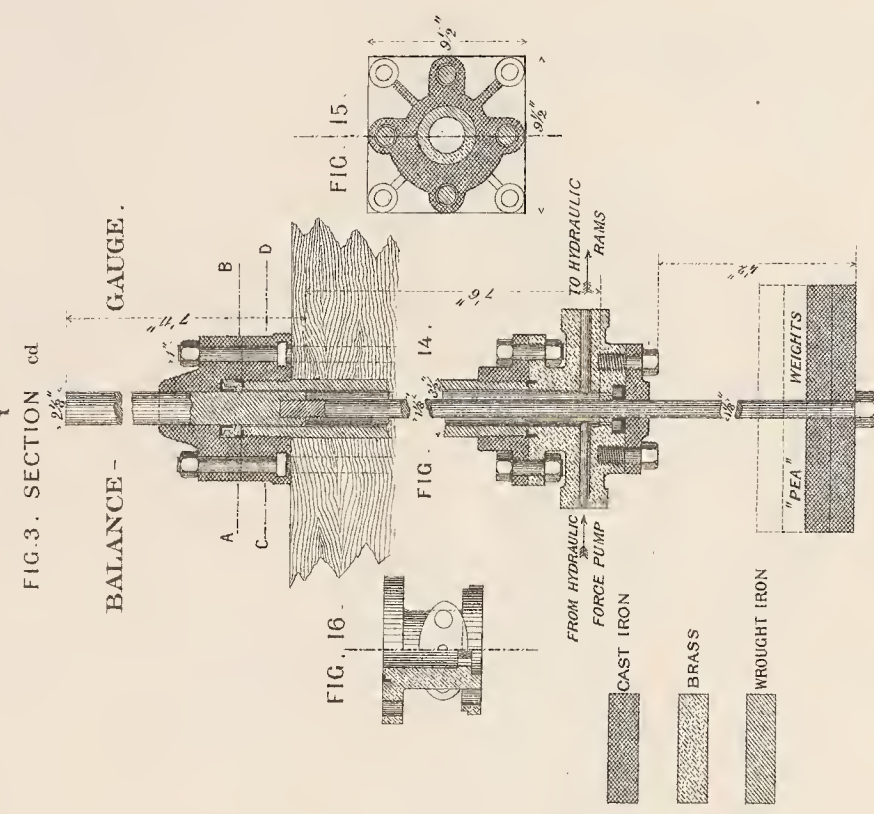
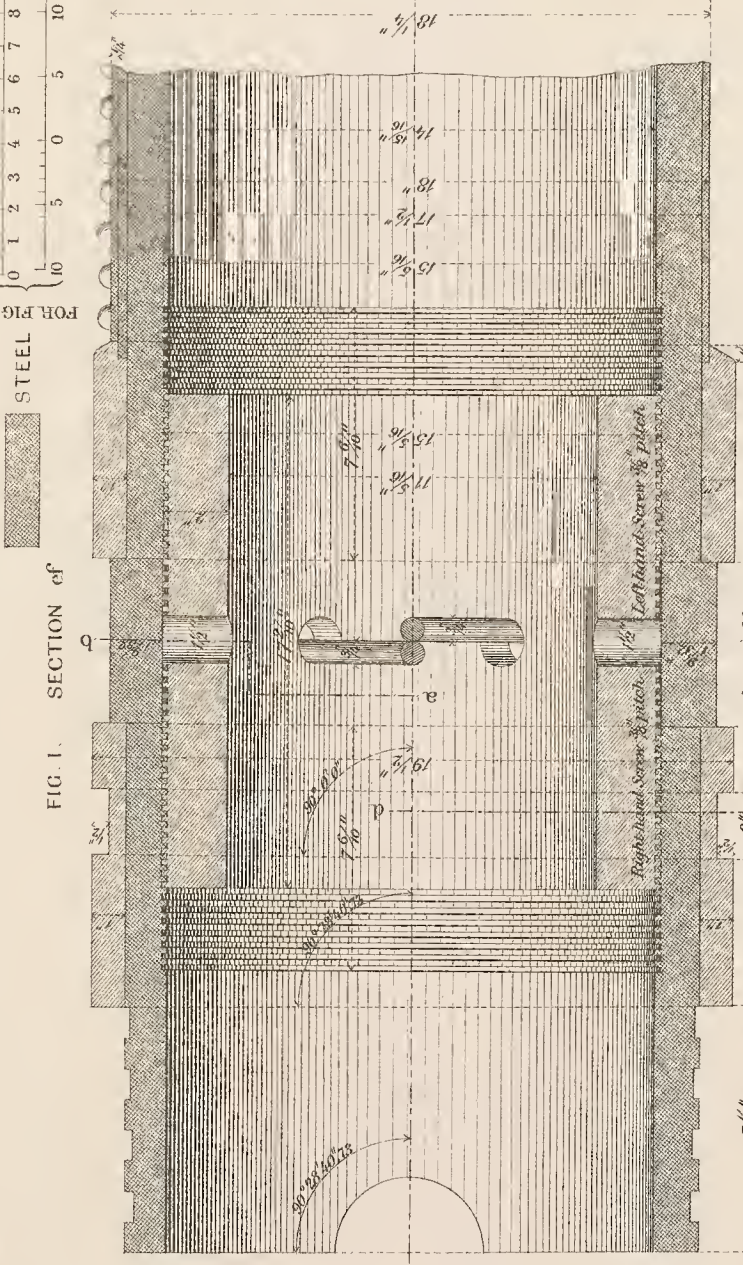
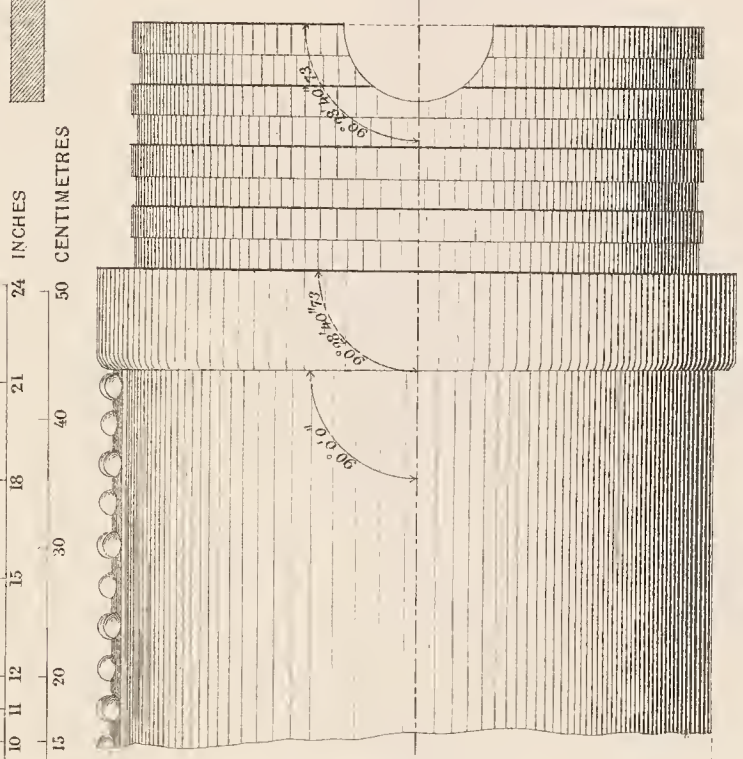
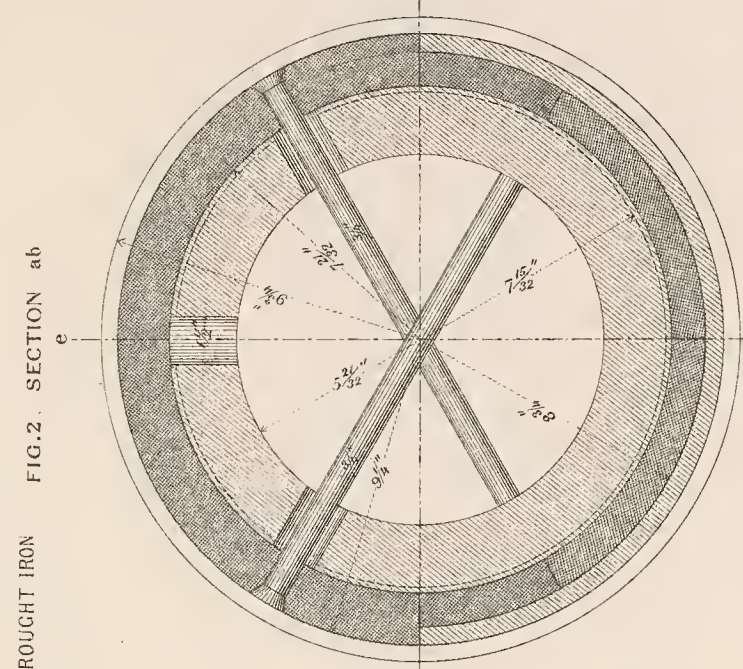
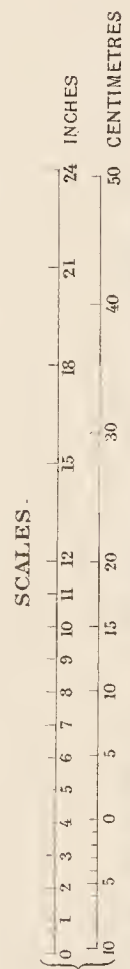






# ADJUSTABLE TUBE AND DETAILS OF ERECTION.

ADJUSTABLE TUBE.



W.P. Gerhard del. 1880.

Julius Bien lith. N.Y.







# DETAILS OF ERECTION.

STEEL.

CAST IRON.

WROUGHT IRON.

FIG. 2.

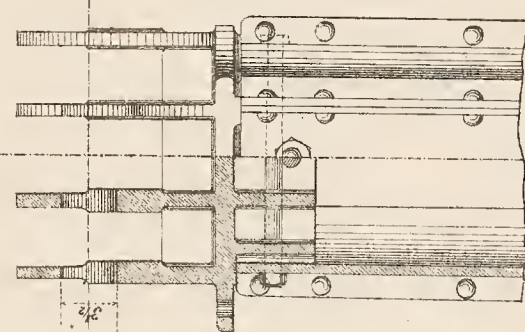
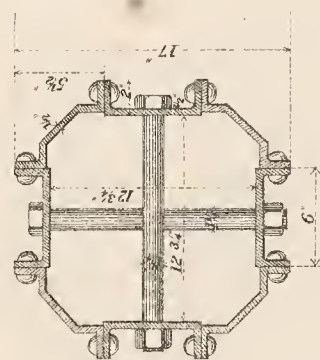


FIG. 3.

SECTION AB OF  
IRON MAST FOR SECONDARY CABLE.



FOR GENERAL ARRANGEMENT  
OF MAST FOR SECONDARY CABLE SEE PLATE XXXVII.

FIG. 1.

MODE OF EASTENING MAIN CABLE  
AND SECONDARY MAST TO TUBE  
AT JOINT N° 12 OF RIB C.  
OF SECONDARY CABLE.

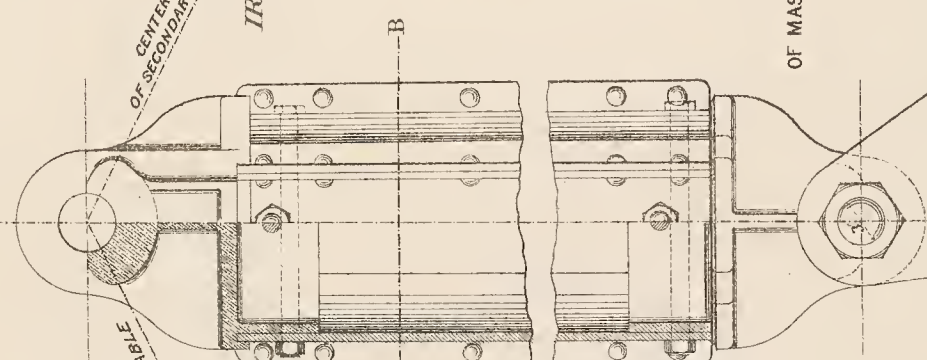
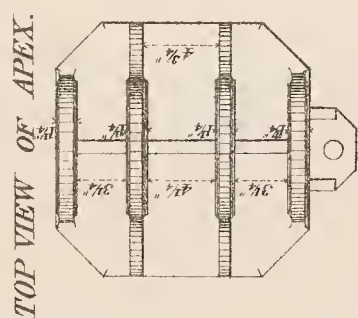


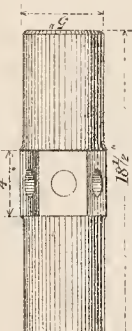
FIG. 4.



TOP VIEW OF APEX.

MAIN CABLE.

FIG. 5.



JOINT N° 12 OF RIB C.

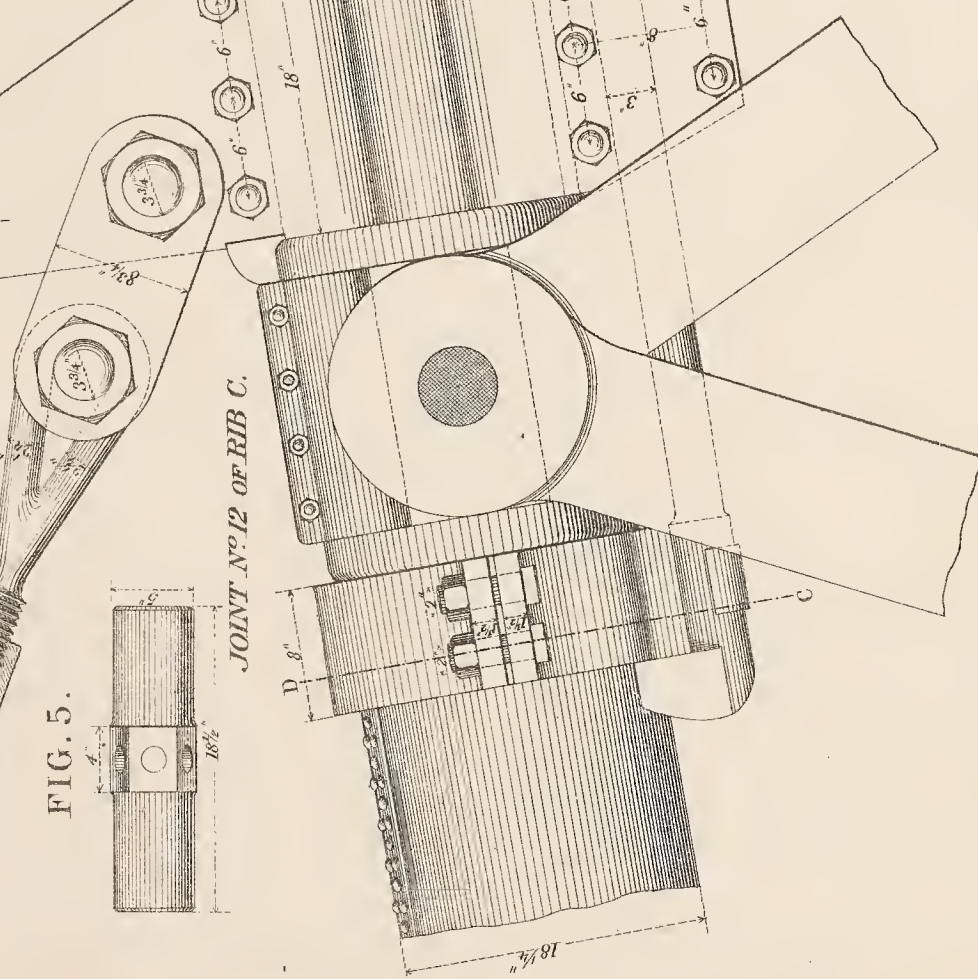


FIG. 8.

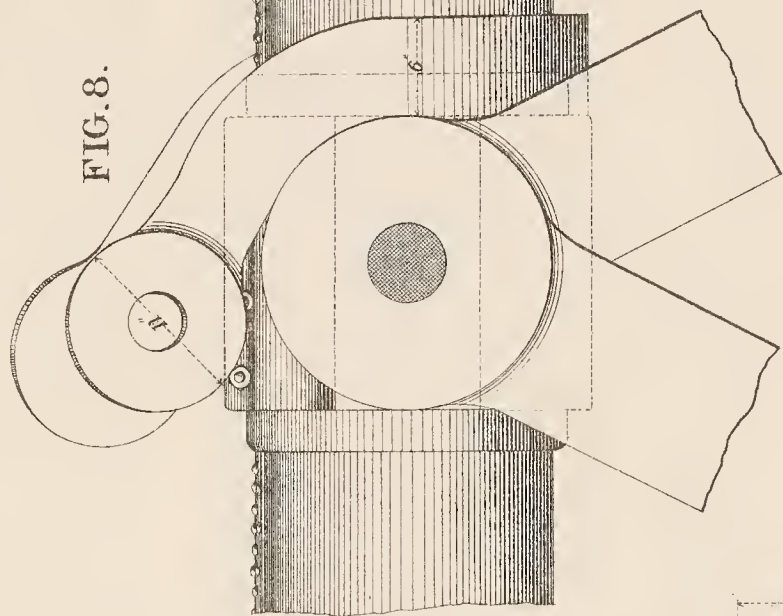
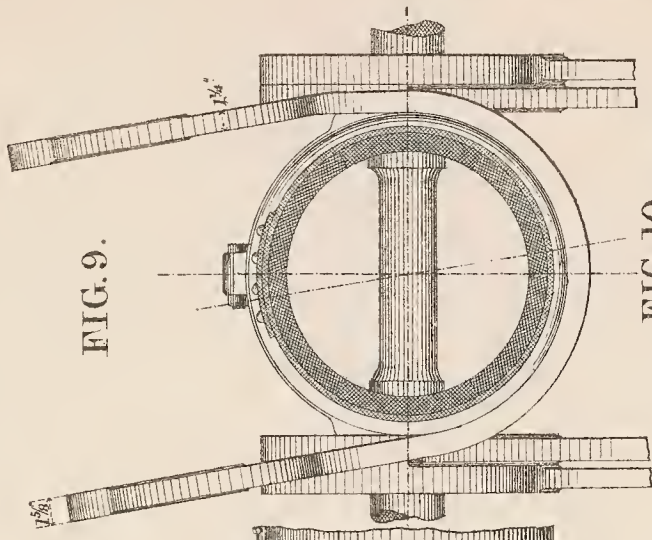


FIG. 9.



STIRRUP CLAMP OF JOINT N° 6.

FIG. 6:  
SECTION CD.

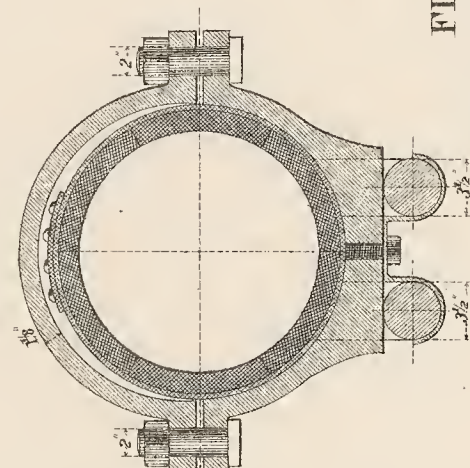


FIG. 10.

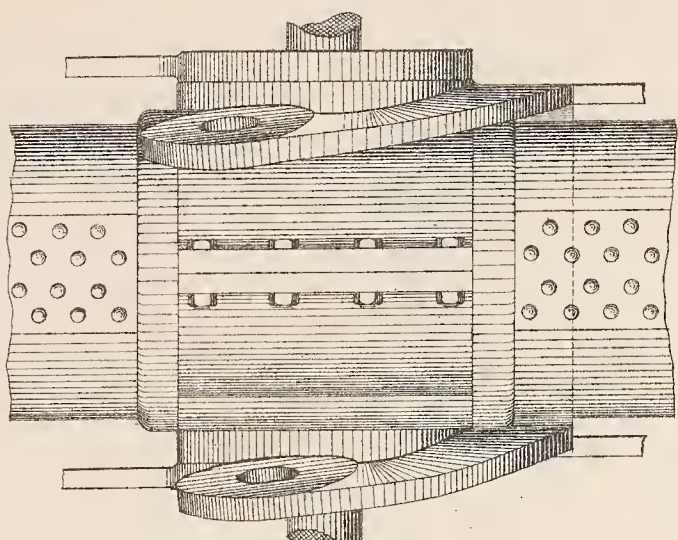
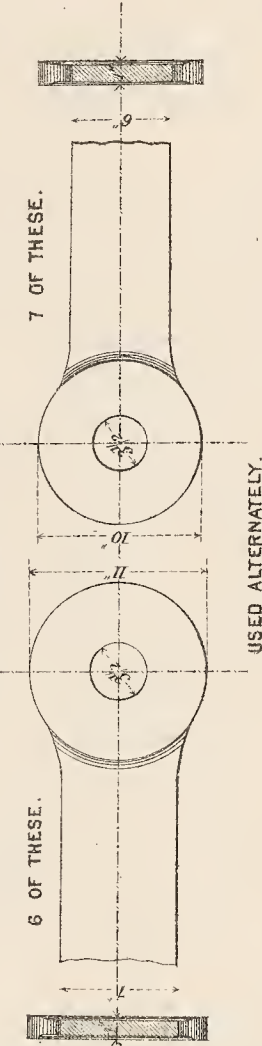


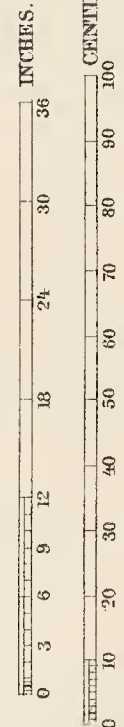
FIG. 7.

LINKS OF MAIN CABLE.



USED ALTERNATELY.

SCALES.









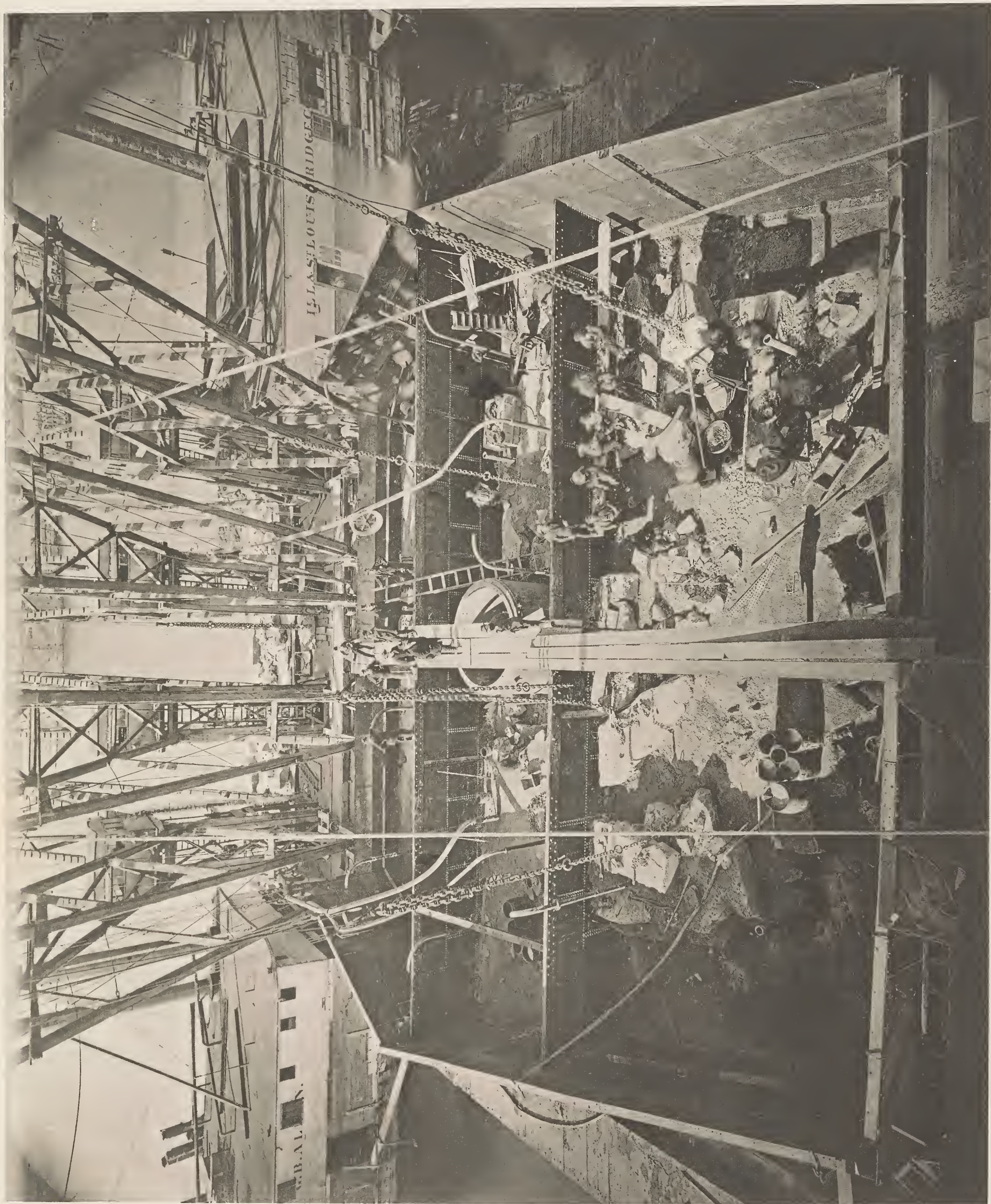


SINKING THE WEST PIER. ICE-BREAKER IN THE FOREGROUND.









SINKING THE EAST ABUTMENT. LAYING MASONRY ON THE FLOATING CAISSON.









ERECTION OF WEST AND CENTER ARCHES. VIEW LOOKING NORTH-EAST.









ERECTION OF WEST ARCH, SHOWING CABLES TO JOINTS 6, 9, AND 12.









THE ERECTION. CLOSING THE CENTER AND EAST ARCHES.









THE ERECTION. THE RIBS COMPLETED AND THE ROADWAYS BEGUN.





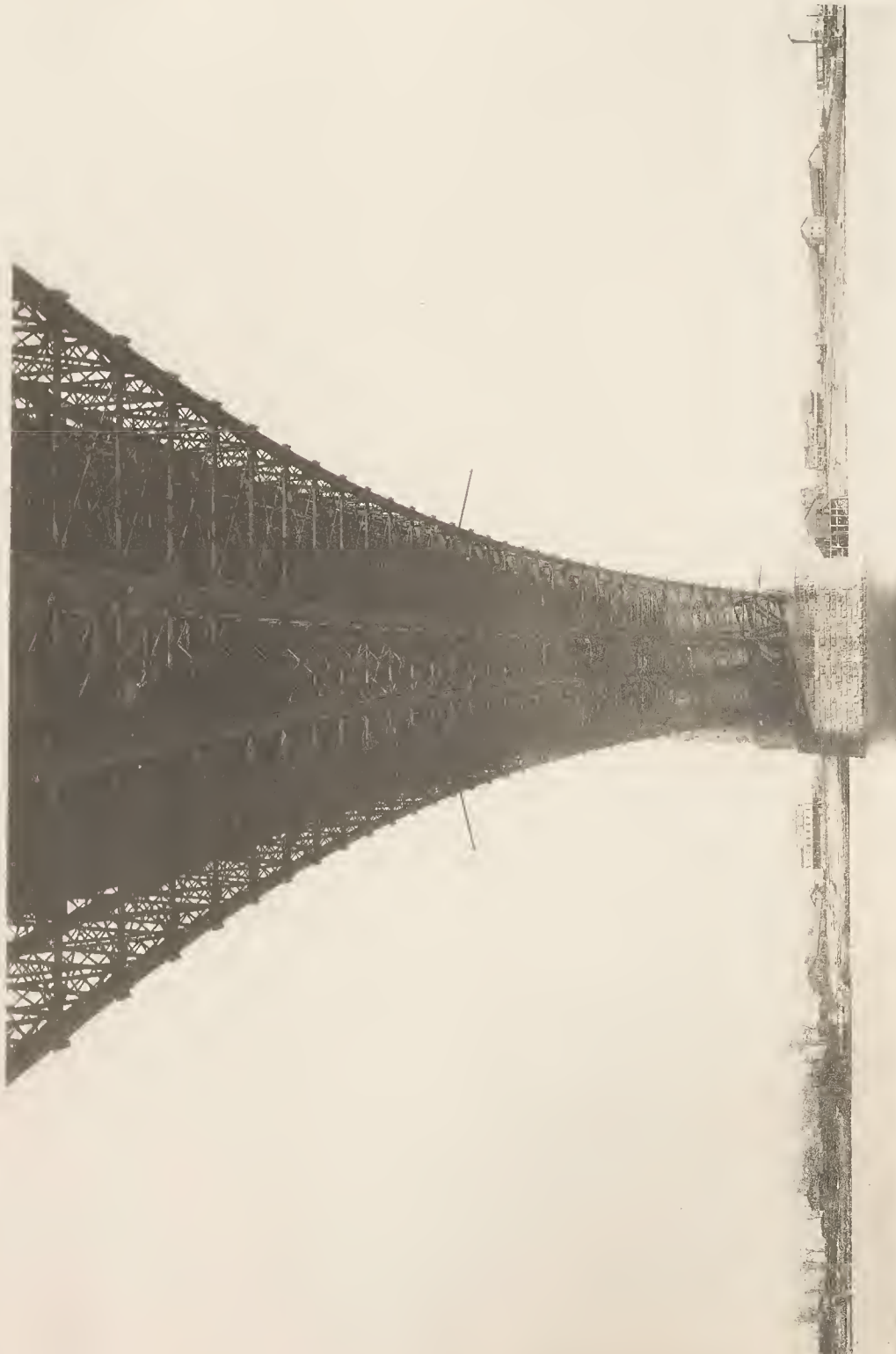




SOUTH TRACK OF CENTER SPAN, LOOKING EAST.



THE CENTER ARCH SEEN FROM BETWEEN THE RAILROAD TRACKS



VIEW OF WEST ARCH FROM WATER'S EDGE AT WEST ABUTMENT.



THE UPPER ROADWAY LOOKING EAST.



















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